

A M E R I C A N FORESTS

SEPTEMBER 1946

35 CENTS

*REPORT ON THE FOREST
RESOURCE APPRAISAL*

• • • See page 413



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Contents

| | |
|--------------------------------------------------|-----|
| MY FAVORITE TREE—"Believe It Or Not" Ripley..... | 395 |
| EDITORIAL—Challenge to Education..... | 397 |
| FORESTRY FIASCO IN THE PHILIPPINES..... | 398 |
| By Carlos Sulit | |
| LOGGERS TAKE TO THE AIR WAVES..... | 402 |
| By Arthur W. Priaulx | |
| LAKE OF THE SKY..... | 404 |
| By Norman Clyde | |
| A FAMILY DISCOVERS FORESTRY..... | 406 |
| By A. G. Hall | |
| ... ON THE SCREAM OF THE PUMA..... | 408 |
| By Stanley P. Young | |
| WOODEN BOATS OF ECUADOR..... | 410 |
| By L. V. Teesdale | |
| REPORT OF THE FOREST RESOURCE APPRAISAL..... | 413 |
| By John B. Woods | |
| HOW MUCH BIG GAME?..... | 429 |
| KNOWING YOUR TREES—Gray Birch..... | 430 |
| By Warren D. Brush | |
| CONSERVATION IN CONGRESS..... | 436 |
| BOOKS..... | 440 |

THE COVER

Western White Pine in Idaho

Photo by Charles A. Wellner, U. S. Forest Service

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The Purpose

The American Forestry Association is a national organization—educational in character—for the advancement of the intelligent management and use of the country's forests and related resources of soil, water, wildlife and outdoor recreation. Its purpose is (1) to bring about adequate protection and perpetuation of these resources by creating an enlightened public appreciation of the need of conserving them through wise use for the present and future welfare and enjoyment of all the people; (2) to make available to Americans in all walks of life a wider knowledge and appreciation of their forest resources and the part they can play in the social and industrial life of our nation.

The History

MORE THAN half a century ago American men and women of vision, stirred by the rapid destruction of forests and forest life in the United States, began to raise their voices in behalf of conservation. Foreseeing the danger of allowing America's rich forests and vast natural wealth to be thoughtlessly wasted, these public-spirited individuals protested the needless destruction that was taking place. Out of their efforts came a collective force — The American Forestry Association, first organized in 1875 and made a national influence in 1882.

The Record

THUS The American Forestry Association has a long record of efficient public service. The establishment of the United States Forest Service and the creation of the nation-wide system of state and national forests and parks were due in no small part to the Association's efforts. Its educational work, extending over more than seventy years, has stimulated public action and built public support for protection against forest fires and floods; for prevention and control of soil erosion; for the development of conservation policies in forest management for continuous production through wise use; for the control of forest insects and diseases and the preservation of fish and wildlife.

The Support

FROM AN ORGANIZATION of a few hundred members three decades ago, the Association has attained a substantial membership of many thousand men and women, living in every state in the Union and in foreign countries throughout the world. The funds of the Association are administered by a Board of Directors composed of individuals of national standing—men and women who give their services free, who have a practical understanding of the nation's present-day conservation needs, and are equipped through experience, ability, enthusiasm and training to advance the Association's program.

The Program

BECAUSE OF its independent, non-political character, the work of The American Forestry Association is vitally necessary in the field of public service. It provides an unprejudiced influence for the development of sound conservation measures. It helps coordinate public, state and federal policies. It cooperates closely with federal, state and private agencies in conservation work. At the same time it initiates, sponsors and carries on needed projects in conservation in addition to its regular broad continuous program of education.

MY FAVORITE TREE



BELIEVE IT OR NOT

RIPLEY



MY FAVORITE tree, naturally, is the most unusual tree in the world (as if you would expect anything less from "Believe It or Not").

This tree is the most sacred thing on earth to one-fifth of the world's population—it is the Bho Tree under which

Buddha sat when he became Enlightened. According to the Buddhist tradition:

"This Tree is the Sacred Symbol of Life and its Growth, an Eternal and Undecaying Emblem of Buddhist Faith, the very Navel of the Earth and the Greatest Center of Human Attraction. The Wind Gods Purify it constantly with Delicious Zephyrs—the Rain Gods shower it with Delightfully Fragrant Waters and Flowers, and when the winds blow, all other trees on earth bow their heads towards it in token of divine respect."

In my travels through some 200 countries, I have seen all of the great and famous trees of the world—such as the Tree of Abraham in Palestine, the Great Tree of Tule in Mexico, the General Sherman, most majestic of all the California redwoods. I have seen that tree in Santo Domingo, "the hitching post of the new world," to which Columbus tied his ship on his first voyage. I have seen the eucalyptus in Australia, which for some unknown reason

has been called the tallest tree in the world. It is not. And I have seen the Tree of Life in the Garden of Eden.

But no living thing impressed me more than the Bho Tree of Buddhism. I was making my seventh visit, or pilgrimage, to Benares, the Holy City of India, the year war broke out. I had been in Afghanistan and was riding down along the "Grand Trunk Road" from the Khyber Pass through Delhi when I decided to stop off at Bodh-Gaya to visit the Holy Shrine of Buddha. This Holy Shrine is the Bho Tree. To better evaluate the full importance of this tree, the Pipul, or Sacred Wild Fig, (*Ficus religiosa*), which is still alive after 2,400 years, I submit this brief resume of Gautama, the founder of the Buddhist religion.

Gautama was an aristocrat, the son of a king possessing great wealth. He was the only aristocrat among other founders of the world's religions, such as Jesus, Mohammed, Confucius, Moses and others. It was this secure state that made him think that life was unfair. And so on the day his son was born, it was brought to his mind in startling manner that he had everything—wealth, position, love, family and now a son—the culmination of all desires.

And as he looked out of the window he saw a beggar limping along in pain and poverty. So he suddenly abandoned his home, his wife, his son—without once even look-

(Turn to page 448)



Editorial

Challenge to Education

IN presenting his report on The American Forestry Association's Forest Resource Appraisal (see page 413) to the committee meeting at Higgins Lake, Michigan, last month to draft a postwar forestry program, Director John B. Woods made some interesting and highly significant observations — so significant, in fact, that they warrant repeating here for the benefit of the public at large.

In essence, Director Woods' comments, reflecting facts revealed by the three-year forest appraisal, add up to this:

America is still a forested country. Good and poor, woodlands occupy a third of its surface; lands suitable to bear commercial timber stands occupy a fourth. This despite the fact that since the Civil War, at least 2,400 billion board feet of lumber have been produced here, in addition to untold millions of cords of wood for fuel and higher purposes, including a vast tonnage of pulp. However, where in the early days timbermen were mighty choosy, taking only the best trees of certain favored species, their sights today are much lower, and in most states loggers are working in regrown timber.

Unfortunately, in the eastern half of the country smaller and smaller timber is being cut, thereby progressively reducing growing stocks, while in the West we still gnaw at the edges of decadent primeval stands, permitting millions of fine trees scattered thickly through the stands to decay and fall, unused.

"Today's forest facts," Mr. Woods said, "tell us that we should think straight and act promptly to put intensive management in the woods, lightening the pressure on decimated

forests and increasing it upon the stagnated virgin stands. The country needs more timber, but the only way we can increase production for long is by growing more wood."

We should be realistic about other matters, too, he said.

"For nearly 80 years the people of America have been told of the predatory lumber barons who would not practice forestry but let their cut-over lands burn, or, worse yet, go back to the counties for non-payment of property taxes. It wasn't a pleasant situation from the standpoint of public welfare; too much wood was wasted in careless logging and by fires. But the brutal fact is that 50 or even 30 years ago nobody could demonstrate that timber growing would pay out on private lands. And lacking sound economic basis, all the tongues of men and of angels could not convert tough-minded operators to forestry."

Actually, those abused privately owned lands have yielded nearly 95 percent of all the timber manufactured and used as lumber and other products. A not inconsiderable part of this production has come out of growth which occurred after the virgin stands had been high-graded or mowed down by the loggers. And wood is still being harvested; saw-timber one and one-half times as fast as it is growing—cordwood a bit less rapidly than its rate of increase.

"Such a condition falls somewhat short of famine, although admittedly it might be better. In fact, it is being made better every day and the rate of improvement can be increased if we wish."

Today the more progressive lumber and pulp-paper companies know

the facts about timber growing and are moving rapidly to practice forestry. Many others require convincing. A good many farmers are taking excellent care of their woodlots; probably 10 percent of the country's three million plus. A somewhat smaller portion of the million other forest owners are aware of the advantages of forest management. But the vast majority of owners in all these categories still is ignorant or unconvinced regarding the possibilities for them in forestry.

"Big and challenging are the jobs of getting word to these various classes of owners and of making available to each group the kind of technical or other assistance needed. Yet even limited experimentation has shown remarkably promising results. Essentially this is a problem of education. Clearly there should be a foundation of stop-loss statutes designed to prevent further unnecessary devastation by the inevitable recalcitrant minority in each state; yet there appears far more promise in education and technical aid than in compulsion. Because forest management is positive, it cannot rely wholly upon 'must-nots'."

Public foresters, concluded Mr. Woods, having fought the good fight against predatory interests, appear to have become complacent. Having been defenders and conservators so long it may be difficult now for them to set new records as forest managers.

"Yet the challenge is there, for the public forests should contribute 20 to 30 percent of the nation's wood instead of eight or nine percent. They, like other owners and managers, must get their forests under intensive management."

◆ "Ohio Woodlot"—Photograph by John Kabel

DURING THE JAPANESE OCCUPATION



Forestry Fiasco

in the PHILIPPINES

By CARLOS SULIT

As we look back over more than three years of occupation of the Philippines by the Japanese and try to put together the loose threads of events which moved swiftly and confusingly through this period, one thing stands out rather prominently. It is that for all their frantic efforts to exploit the Philippine forest resources, the Japanese succeeded in getting very little.

This seems surprising considering the wonderful possibilities in these resources and the fact that, to start with, they had in the Islands at the outbreak of war Japanese operated lumber companies that could serve as nuclei for effective machinery for timber production and manufacture. They tried their best, but met diffi-

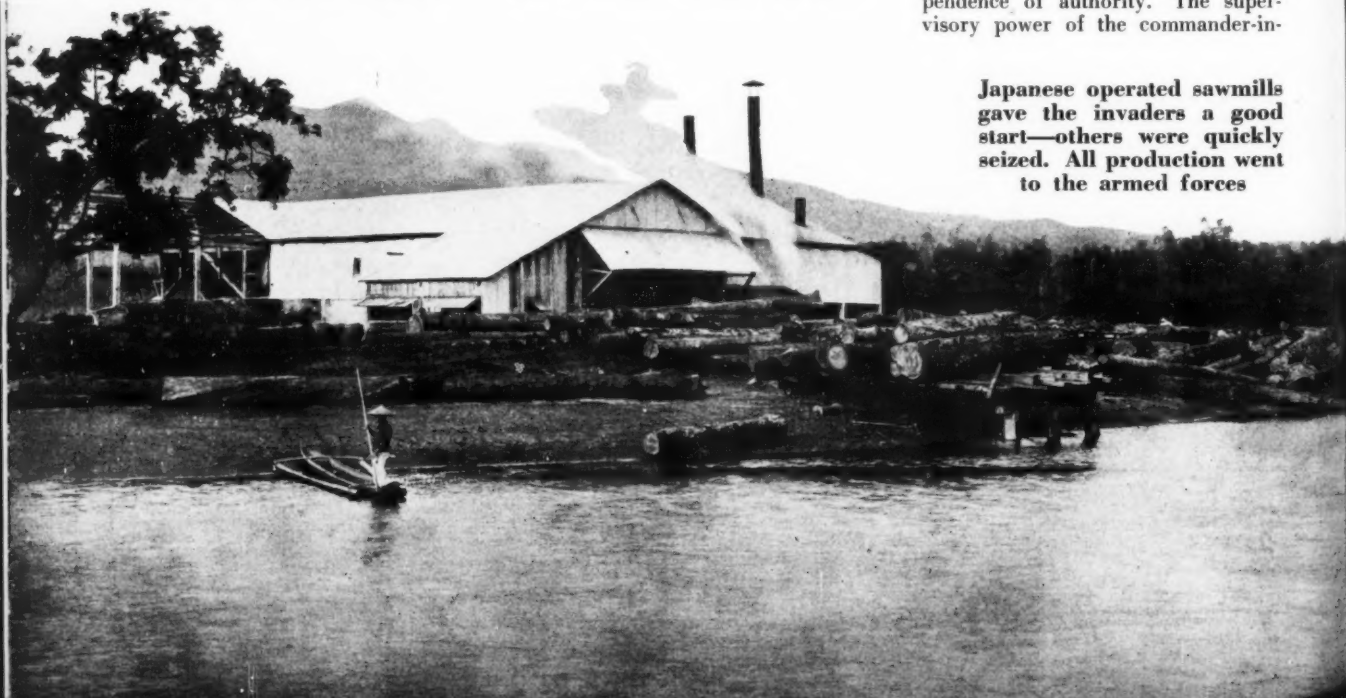
culties they were not able to overcome, bottlenecks they were unable to solve, and local indifference they could not cow with reprisals. If they succeeded at all, it was in terms of the magnitude of destruction the occupation wrought upon forest resources, forestry work and the forest industries.

On December 10, 1941, three days after the attack on Pearl Harbor, Japanese invasion forces landed simultaneously at several points on Luzon Island. Numerically superior and better equipped, they drove back the American and Filipino defenders and, on January 2, 1942, occupied Manila. After this, the Japanese lost no time in organizing the Philippine government, realizing that order

and peace in their midst and at their rear were necessary to prosecute the Greater East Asia War. Equally important, it was necessary to exploit the Philippine resources and make them contribute to the war effort.

Upon entry in Manila, the commander-in-chief issued a manifesto urging the people to cooperate and enjoining those occupying positions in the government to stay at their posts. On January 23, he issued Order No. 1 establishing the Philippine Executive Commission, naming Jorge Vargas as chairman. The commission was to function under the direct supervision of the commander-in-chief and, as it turned out, except for the most routine matters, it did not enjoy any appreciable independence of authority. The supervisory power of the commander-in-

Japanese operated sawmills gave the invaders a good start—others were quickly seized. All production went to the armed forces



For all their grandiose plans, the Japanese left only wanton destruction as a monument to their efforts to exploit the forests of the Islands. Here, in a two-part article, the head of the Philippine Bureau of Forestry tells why and how they failed

chief over civil affairs of the occupation was later transferred to the director general of the Japanese Military Administration.

On January 30, Chairman Vargas issued Executive Order No. 1, outlining the Central Administrative Organization. This consisted of six departments, each headed by a commissioner—interior, finance, justice, agriculture and commerce, education, health and public welfare, and public works and communications.

Characteristic of the confused manner in which the Japanese handled things, were their pronouncements on basic policy in the Philippines. Some were blunt admissions that all resources of the Islands should be harnessed to become a war tool of the empire, while others were in the guise of inspirational appeals to racial feelings, exhorting the Filipinos to develop the Islands to become a worthy member of the Greater East Asia Co-Prosperity Sphere.

Their first major objective was to make the Philippines self-sufficient in her prime requirements, which among other things included feeding and maintaining the occupation army of approximately half a million men. A corollary step was to secure from the Islands all essential war materials that Philippine labor and resources could produce.

A program of reorganization of domestic industries to accomplish this objective was formulated. As before the occupation, work relative to the administration, conservation and promotion of natural resources was placed under the Department of Agriculture and Commerce. That pertaining to forest resources continued to be the responsibility of the Bureau of Forestry.

Later the Division of Fisheries was fused with forestry and the bureau was renamed Bureau of Forestry and Fishery (Ringyo Suisan Kyoku).

A field service was also organized and all districts and forest stations in the Islands were authorized to open. Guerilla activities, however, kept many offices from opening and when opened, from functioning.

Supervision by the Military Administration on the forestry and fishery activities was vested in a Japanese corps known as the Rinsuika. Except for the addition of work and functions relating to fishery matters,

the jurisdiction and authority of the bureau remained as they were before the occupation.

During the first days of the occupation of Manila, many government employees, including some forestry men, continued to go to their offices. Some did this to take care of government property and records; others because they thought the Japanese would soon be driven away. After the Central Administrative Organization was established and when it looked as if the Japanese would stay, forestry men remained on their jobs not only because they were required to, but also because they knew it would be for the best interests of the forests.

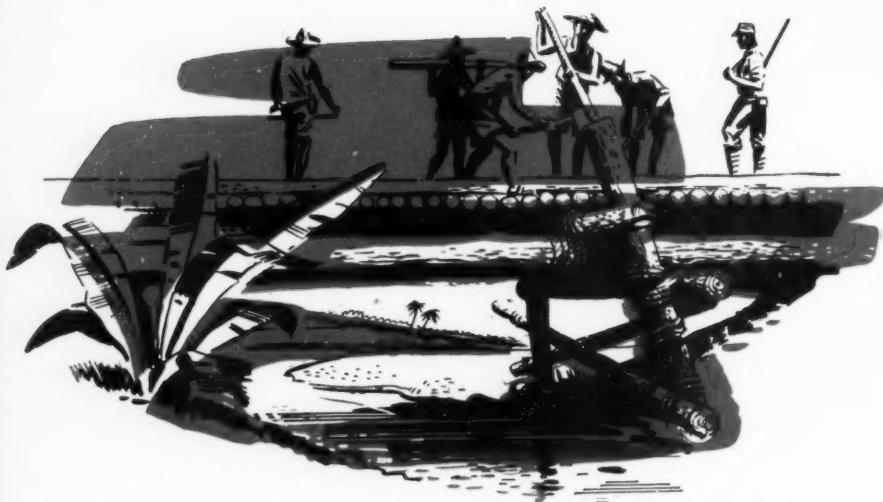
Financial difficulties were soon encountered by the government and the bureau went on with limited personnel. Under these circumstances very little forestry work could be done. Forest research, maintenance of reforested areas, prevention of forest destruction, land classification and forest inventory were practically abandoned.

On October 15, 1943, the Republic of the Philippines was proclaimed with Jose P. Laurel as president. The Department of Agriculture and Commerce became the Ministry of Agriculture and Natural Resources. The change in form of government did not, in practice, bring autonomous powers to the Republic; the authority of the Imperial Japanese Forces continued to be supreme. The Military Administration was dissolved but, nevertheless, the military continued to dictate to the Bureau of Forestry.

By Act No. 10, passed by the National Assembly in its first regular session, a Bureau of Fishery was created, bringing about its separation from the Bureau of Forestry.

The Japanese expected to make the forests of the Philippines yield timber





Benguet pine, which the Japs planned to use for pulp industry



and lumber and minor products in as large quantities as they would produce. During the early part of the occupation the most urgent need was for material for construction and repair of harbors, wharves, bridges, railways and barracks. Bridges in particular had been destroyed all over the Islands.

While they did not find any sizable quantity of building materials, the Japanese were quick to improvise on the spot. In the vicinity of a broken bridge, the military commandeered timber and lumber from *tablerias*, or tore down wrecked buildings for such material as they could salvage. In many instances, bamboos and palms were used. When these were not available they utilized fruit trees like santol, tamarind and camagon.

The Japanese found in the Philippine forests excellent materials for shipbuilding. To replace large mercantile losses, shipyards and dockyards were established in Manila and in many other places. In these were built in increasing numbers wooden ships, assault boats and fishing schooners. Numerous barracks and billets for soldiers were needed, and as lumber could be put to better uses, bamboos and nipa thatches were utilized. Thus, bamboo plantations near army centers suffered severely.

When the supply of medicines became inadequate, local medicinal plants like dita for malaria and dysentery, and makabuhai for beriberi, were freely used. Nails, screws and wire were hard to obtain, so tying materials like rattan and kilob were in demand. Several Japanese subsidized companies started or had plans to establish paper pulp factories to utilize Benguet pine and bamboo, while others focused on the gathering

and procurement of resins, gums, tannin and oils. In short, no possibility of the Philippine forest resources was neglected.

The Japanese had a good start in their work. At the outbreak of war, there were three Japanese lumber companies operating in the Philippines. In addition, 11 other companies served as nuclei of their lumber operations soon after the Islands were occupied. The Philippine Lumber Exportation Company, for instance, promptly went about renting or acquiring other sawmills.

Other Japanese companies not engaged in lumbering soon expanded their activities in this direction. The Furukawa Plantation Company at Davao, primarily in the abaca business, acquired the plants and concessions of four lumber companies. Logging and milling plants of Americans, British and other enemy nationals were taken over promptly. In the case of Filipino owned plants, Japanese companies purchased some.

To effectively control wood production and distribution, the exploitation of the timber and lumber of the Philippines was placed under one large Japanese company—the Philippine Lumber Control Union (Philippine Mokuzai Tosei Kumiai). The union divided the Islands into several territories and each was placed under a member or subsidiary company, which had exclusive operating power. Filipino operators were forced to dispose of their products to the company holding the territory. All lumber and timber produced went to the Japanese armed forces.

The union adopted a uniform schedule of prices for timber and lumber but it was common to see various companies competing for the limited supply in order to fill their quotas with the consuming armed outfits. Prices in the black markets soared, and while the cost of production rose with the prices, the control prices of the union continued in force. This placed the Filipino operators at the mercy of the union. Many stopped operations. Some took chances on the black market. Racketeering and smuggling were common.

Working also to the disadvantage of Filipino operators was the fact that Japanese companies could draw any quantity of labor they needed.

Transportation was another difficulty of local operators. The railroad service was inadequate and uncertain. At one time, in December 1943, two million board feet of timber and lumber were stocked at stations along the Manila Railroad southern line, unable to be moved for lack of rail-

road wagons. This tied up the capital of local operators. Trucks for hauling were scarce and grew more scarce as they outlived their usefulness through lack of replacements and repair parts. Liquid fuel was hard to secure or its price in the black market prohibitive.

Following the law of limited supply and unlimited demand, prices of all commodities rose to fantastic heights. This was further aggravated by the indiscriminate flooding of the country by billions of Japanese war notes. The price of lumber soared 1,000 percent over the prewar level. Indeed, cost of wood became so high that wood coffins became a luxury few could afford. This despite the schedule of controlled prices set by the union and later by the Forest Products Producers Federation.

To protect the Filipino operators from exploitation, the Bureau of Forestry took their case to the Rinsuika. As a result, the union was ordered to stop buying timber and lumber directly from Filipino lumbermen, and the director of forestry was instructed to act as a sort of general broker to do the buying for the union.

The improvements expected, however, did not materialize. For one thing, licensees experienced delays in getting paid by the union—delays that consumed whatever margin of profit they could make. The union also discovered there was nothing that bound the licensees to sell through the bureau and leakages to the black market were considerable. The Rinsuika wanted this remedied and ordered the formation of a Filipino federation of lumbermen. Acting on this order, the Bureau of Forestry on July 13, 1942, called a conference in Manila of Filipino licensees. An outcome of the meeting was the formation of provincial or regional associations which would, as planned, later on be fused into a federation. All timber licensees operating in a province or region were to bind themselves into a lumber producers' association.

By August 16, 1943, with 37 of these associations in existence, an executive order was issued authorizing the formation of these into a Forest Products Producers' Federation—and on September 17, the federation was formally inaugurated. Three months later the federation had 40 member associations with a total of 1,479 forestry licensees as members through the various associations.

The Japanese hoped that all the production of the Filipino operators would be routed to the associations



When they failed to find lumber and timber, the Japs improvised on the spot, using coconut and areca palms to repair and build bridges

and from the associations to the federation. It would thus be easy for the military to get hold of the production.

The federation took over the forestry personnel at Kumiai and with these as a nucleus organized its technical force. Practically all technical employees of the federation were forest officers in the former Bureau of Forestry.

Despite every exertion made by the Japanese, production of timber and lumber was generally low. Difficulties in communication prevented the compilation of output throughout the Islands. The bureau reported that from January 1942, to March 1943, production was 32,373,000 board feet. No definite figures were available regarding the output of logging and milling companies directly operated by the Japanese, but in the case of Filipino operators, their combined output was 200 thousand board feet in December, 1942, and a million feet in April, 1943. This output, of course, did not include an unreported quan-

tity that went into the black market.

When the federation took over, it reported that from September to December 1943, it handled 5,760,850 board feet of timber and lumber, in addition to 150 thousand railroad ties and 8,111 poles and piles.

Although complete data are not available, total production was in general very low and might possibly have averaged only 3,500,000 board feet monthly. In 1941, before the occupation, monthly production was 78,000,000 board feet. And, it is interesting to note, after liberation of the Philippines, even with most of the sawmills destroyed, production for the nine-month period (May 1945 to January 1946) was around 38,500,000 board feet, or approximately 4,280,000 board feet monthly.

The collapse of Japan's attempt to exploit the forests of the Philippines—the extent of forest destruction during the occupation—and the dramatic story of forestry under the guerilla government will be related by Mr. Sulit in the October issue.



By ARTHUR W. PRIAULX

EARL Headrick, giant six-foot-three production boss for Werner Timber Company out in Oregon's Lincoln County, found trouble on his early morning round of operations. A dump truck had broken down on a road construction job, and the road would be needed very soon. The handsome, unruffled man on whose shoulders maximum production of logs rests, took the situation in stride. He walked over to his pick-up truck and took down the microphone from his portable send-receive short-wave radiophone.

"Hello office. This is Earl. The drive shaft on the dump truck is broken. Can you send one up before noon? I'll have Bill install it right away so we won't lose any time. Go ahead."



At headquarters, Assistant Superintendent Bob Wilson, at radiophone, relays urgent message from woods to General Manager Roll Williams

More than 20 miles away across rough landscapes in the Coast Range Mountains, at the company's headquarters at Taft, a small red light glows on a compact, master short-wave radio set, and Earl Headrick's message comes in plain enough for everyone in the office to hear. Assistant Superintendent Bob Wilson picks up the microphone.

"OK, Earl. We'll have one on the next truck going back to camp. Is that all?" Back came the answer: "That's all now. KEPX signing off." Headrick replaced the microphone and flipped off the radiophone circuit to save his truck battery.

Thus does Werner Timber Company put radiotelephony to use. First logging outfit in the West to use this modern means of communication, Roll Williams, enthusiastic general manager, says his firm wouldn't know what to do without radiotelephony instant communication. He points out that this contribution of science has saved his company thousands of dollars and greatly speeded up production, saved lost time from breakdowns, helped in reporting fires and accidents, kept headquarters in touch with every phase of their operation spread out over 20 square miles of rough timbered country.

It was during the toughest of the war years—1943—when Roll Wil-

liams got the idea of installing radiotelephony communications on his operation. Taft is right on the Oregon coast and the possibility of a Japanese attack was not merely a dream. Also, the possibility of forest fires started from Jap balloons was a constant threat. Speedy contact with his loggers back in the forests to prevent these fires spreading if they were once started from incendiaries dropped from free balloons, seemed only good sense. Armed with this ammunition and the added fact that the company was getting out large quantities of vitally-needed logs, Werners finally won Federal Communications Commission approval, with the help of A. G. Simson, technical advisor for the U. S. Forest Service, who long has been an advocate of radiotelephony for logging operations.

With federal approval assured, Roll Williams ordered a master radiophone send-and-receive set for headquarters and a similar set for the logging camp, and installed antennas on an unused spar tree at camp and a tall pole at the office. Into Earl Headrick's pick-up went a small, seven-pound portable radio, which exactly fits into the glove compartment; a similar set went into the car driven by Superintendent J. M. (Jack) Wilson, Bob's father. Total cost of all the installations was \$1,250—and that included installing the antennas.

With this practically trouble-free radiophone equipment, these key men in one of Oregon's large logging operations know what is going on at

◀ Radiophone in his pick-up truck enables Production Boss Earl Headrick to reach company headquarters, 20 miles away, in a matter of seconds



LOGGERS TAKE TO THE AIR WAVES

all times in their three-sided working units. In addition to handling all the routine business between headquarters and camp and all points of the logging show, the radiophones have proved invaluable in fire weather and in emergencies.

In the case of injury to a workman, headquarters can have a doctor and nurse and ambulance available immediately, and in some cases this could mean saving a life. Fortunately, this operation has never had to use the radiophones for reporting fires, having one of the best fire records in Oregon. And seldom do they have an accident, but as Roll Williams says, "It's nice to know you're ready when something does come up."

Then he added, "I have no idea how many thousands of dollars radiotelephony has saved us since we installed the equipment during the war to speed up operation by eliminating waste and lost time. But we would never be without this method of communication. I am sure there are days when it has paid for itself. After three years of use it has become as much a part of our operation as our trucks and cookhouse."

The Werner operation has been the guinea pig in radiophone use and after three years is able to endorse this rapid-fire, low-cost communica-

tions method for the logging industry. Roll Williams points out some of the conveniences over telephones. "We found that telephone lines were always giving us trouble. When it wasn't a fallen tree causing line trouble, a band of elk or deer would run into lines and tear them down. Now, when we move camp, all we have to do is string up a new antenna and we're ready for business. We have to watch only one factor—that our antennas are high enough so that direct-beam waves will not be deflected."

No person may use the send-and-receive sets without license as an operator from the F.C.C., and this point brought up real problems during war times when applicants for license had to submit birth certificates as well as take a written examination. Now, eight of the Werner key personnel are licensed—Roll Williams, Jack and Bob Wilson, Earl Headrick, all previously mentioned, and Bill Headrick, brother of Earl, B. B. Deitrick, office manager, Louis Headrick, another brother, who works in the woods, and Maurice Champlain, bookkeeper. With this array there is always some one at camp and office who can operate.

A daily report must be kept of each call, showing the time of call, who

talked, who answered and the subject discussed. The daily reports are submitted at regular intervals to the F.C.C., but the task is not difficult for an experienced operator can fill in the form, always handy on his desk, even while he is talking.

One Monday recently, which the Werner organization called "Blue Monday," readily understood in checking the log, the following calls were sent over the set. A check of the variety of the information exchanged by the various radio-controlled units of the operation, easily proves the extent to which Werner uses this fast means of keeping in contact. It also shows how this operation is able to speed up production by eliminating costly shutdowns due to breakage or disabling of woods equipment.

Here is the log for one day:

- 6:10 A.M. Bill Headrick checked in from camp to office to see about weather, and find out whether crew should come out or not.
- 7:40 A.M. Earl Headrick called from camp for signal wire for whistle punk.*
- 8:10 A.M. Camp called, gave time-keeper information.*

(Turn to page 446)

"OK—is that all?" Radiophone communication between woods camp and headquarters saves time and dollars and speeds up production



Lake of the Sky

By Norman Clyde

Little known Lake Tulainyo, hidden in a small basin near the summit of Mt. Whitney in the California Sierra, enjoys the distinction of being the highest large body of water in continental United States

LYING at an elevation of 12,865 feet in a shallow basin on the crest of the Sierra Nevada a few miles north of Mt. Whitney, the loftiest mountain in continental United States, Lake Tulainyo is not only the highest lake of its magnitude in the Sierra but, it is claimed, in all of North America, exclusive of Mexico. It is also remarkable for a mountain lake in that it is without

a surface outlet. There is evidence, however, of a subterranean outlet, or at least water permeating the disintegrated granite west of the lake emerges some distance below it in a small stream.

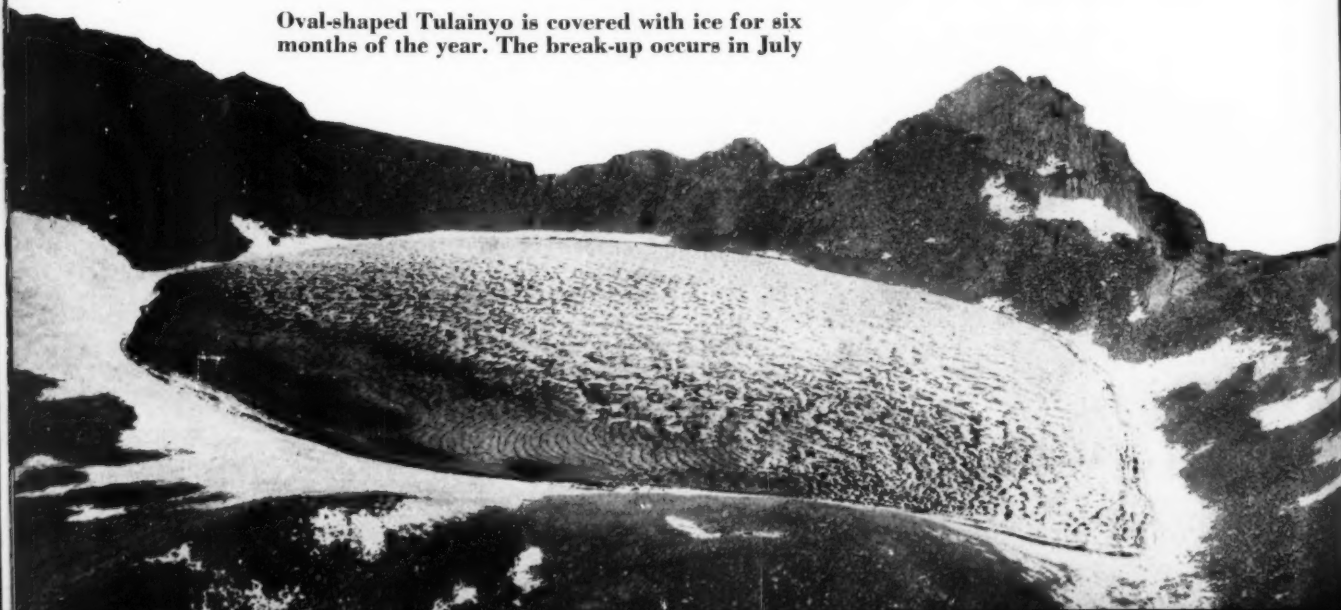
Tulainyo is oval, almost circular in form. When viewed from the surrounding peaks of the Inyo National Forest, its limpid blue water appears to be indigo. It is covered with ice for six months or more of the year, but because it is rather well exposed to sunshine, the break-up occurs earlier than in some Sierra lakes at lower elevations, but more closely hemmed in by mountains. There are no glaciers around its margin, but a deep snow bank usually remains throughout the summer along its western edge.

Lake Tulainyo is also noted for the fact that a few bighorn still sur-

vive close by along the crest of the Sierra. In mid-summer one cannot travel far in this region without coming upon evidence of their presence in the form of bedding places scooped out of the disintegrated granite or occasional cropping and digging up of alpine plants. In winter, of course, they descend to lower elevations.

On an unnamed peak southeast of the lake a few of these picturesque animals spend considerable time every summer on a steeply inclining summit slope which averages about 13,000 feet above the sea. Once while the writer was ascending this mountain accompanied by two friends, four large rams, three of them magnificent specimens, were observed at close range. When they became aware of our presence, they bounded away, only to stop at 50 yards to face about and gaze at us with ob-

Oval-shaped Tulainyo is covered with ice for six months of the year. The break-up occurs in July



vious curiosity. They repeated this performance several times. Then apparently having satisfied their curiosity and reached the conclusion that we meant no harm, they lay down quietly among the rocks.

As a rule, the ice breaks away in Tulainyo early in July. But since no two winters in the Sierra are alike, the time of the break-up may vary considerably. It is a rather interesting sight to watch scores of large cakes of ice floating in the deep blue water, especially when they are propelled by a strong wind.

On the occasion of one visit to the lake the writer observed several rosy finches flitting about from cake to cake, picking up insects deposited on the snow and ice by strong upward currents of air coming from considerably lower elevations. During spring and much of the summer these interesting little birds, the most alpine in their habits of any found in the Sierra Nevada, subsist mainly upon insects deposited on the snow in this fashion. Trout in the high country streams and lakes also depend on insects in considerable measure for food, since, as the snow gradually thaws, many of the insects are carried down into the lakes and streams.

Wildfowl seldom alight on high altitude lakes in the Sierra, perhaps because there is little food to be had in their deep, cold water. Once, however, from the top of Tunnabora Peak to the north of Tulainyo, a flock of a dozen or more wildfowl was observed swimming about in the lake ruffled by a stiff breeze. Perhaps it was an "emergency landing." They were too distant to be identified even with binoculars.

A few years ago, despite great difficulty in getting pack animals to such a high elevation over trailless and in part precipitous terrain, a large number of golden trout fry were taken up by pack mule and deposited in Tulainyo. While on several visits to this remote lake subsequent to this planting, although the crystal clear water along a considerable portion of its margin was carefully scrutinized, no trout were observed by the writer. Recently, however, on reliable authority, he was informed that a visitor to the lake had observed numbers of golden trout in the icy water and that these were still small and fiery red in hue.

So far as the writer knows, however, no angler has caught a trout



A deep snow bank along its western edge contrasts sharply with the indigo of Tulainyo's water — water, incidentally, which has no surface outlet

Golden trout have been planted in this lake of the sky, and while they are believed to have survived, there is no record of any being taken by anglers



in Lake Tulainyo. Two years ago, with a friend, he made an ascent of a nearby peak. As our route led past Tulainyo, we took along fly casting outfits. The lake, however, although it was past the middle of July, was still frozen over, and we were deprived of the opportunity to try our luck.

Westward from the rim of the lake, except where broken by a tier of cliffs, the terrain sweeps down at a moderate angle to the spacious and almost circular amphitheatre, 10 miles or more in diameter, on the headwaters of the Kern River. By climbing only a short distance on

the opposite side of the lake to the crest of the Sierra, one can look down the precipitous, gorge-cleft eastern escarpment of the range to the wide trough of Owens Valley, almost two vertical miles below.

A sweep of sapphire-hued water lying on the very crest of the Sierra, with lofty granite mountains to the north, east and south, and with Mount Whitney, 14,495 feet in elevation, highest mountain in continental United States, immediately beyond, little known Lake Tulainyo, the highest lake of its size in the United States and Canada, is indeed a remarkable body of water.

A FAMILY DISCOVERS FORESTRY

By A. G. HALL

Here is a development in rural living which may well provide a pattern for small-scale forestry enterprises on a family basis

"You can't miss the Hoffman place," said a local resident. "There's a big stone off to the side of the road."

He didn't inform us that set into this big stone was a block of marble on which was inscribed "Ivy Hill—Dedicated to Conservation." We discovered it later, also that the stone was a landmark in the area near Cockeysville, Maryland. And, after visiting Ivy Hill, we discovered something else—that the legend on the block of marble might well have read "dedicated to human living."

For at Ivy Hill, H. Lee Hoffman and his family have initiated a development in rural life which may provide a pattern for small-scale forestry enterprises on a family basis.

Ivy Hill Forest is a 100-acre woodland tract on Chestnut Ridge, between Worthington and Green Spring valleys, 15 miles north of Baltimore. On land which in 1850 bore crops of tobacco, the Hoffman family today is harvesting crops of second-growth pines and hardwoods. The name, Ivy Hill, comes from the local custom of calling the native mountain laurel "ivy" or, more commonly, "ivory."

Nearby is the old Beaver Dam Quarry from which came the marble for the Washington Monument—and, incidentally for Baltimore's famous white steps. The quarry now is filled with water, but the Hoffman's suc-

ceeded in obtaining a block of it for the forest's stone marker.

Mr. Hoffman, a Baltimore advertising man, purchased the tract in 1943 as an investment in forestry and as a site for his home. First, however, he obtained the services of the assistant state forester in appraising forestry possibilities on its 20 acres of pine and 80 acres of mixed hardwoods. Little cutting had been done in the forest since its regeneration following 1850, except for some harvesting of chestnut and oak in 1925. Assured that the area had possibilities as a forest enterprise, Hoffman went ahead with his plans.

War demands for forest products made it possible for him to put Ivy Hill into operation almost immediately. An experienced forester and sawmillman employed by the state in cooperation with the federal government's Norris-Doxey program, assisted his son, Harry Lee III, in marking the timber to be cut and in drawing up a management plan. The forester's recommendations included the harvesting of 20 acres of Virginia pine, 75 years old—straight mature trees 12 to 24 inches in diameter and from 50 to 75 feet high.

The federally-sponsored Timber Production War Project assisted in solving the early production and marketing problems. The Hoffmans have taken every opportunity to cooperate in state or federal programs designed to assist landowners in meeting their problems. They are signers of the local soil conservation agreement and cooperators in the Maryland Forest Conservancy Act. As tax-paying citizens, they believe it their duty to support state and federal conservation programs and to utilize the expert services thus offered. Similarly, they are active in organizations which further their conservation ideals. Both father and son are mem-



◀ The Hoffmans—all have a part in this family enterprise

bers of The American Forestry Association.

As a producer of saw logs and pulpwood for the war, Hoffman was able to obtain authorization for the beginning of the structure which is now the family homestead. First, however, he had to convince the agent in the local priorities office that "timber is a crop" and that he was entitled to the same consideration as were producers of grain, meat, or vegetables.

The residence was an unfinished structure when the Hoffmans first took occupancy. "The night we moved in, Mrs. Hoffman, Harry Lee, Charlotte, Martha and the three ducks slept in the cabin down the hill," he related, "while I rested on an army cot half in the dining room and half in what was to be the living room, with nothing between me and a thunderstorm but tar paper."

Now that the home is completed, Hoffman expresses his feelings this way: "We are warm in the winter and cool in the summer. Every sunrise and every sunset is worth the price of admission alone, with every all-too-short-day-in-between thrown in for good measure."

When one asks the Hoffmans if the project is a paying one, their answer is a unanimous and emphatic, "Yes!" But they are not speaking in terms of monetary return. They draw attention to their not having had any illness since coming to Ivy Hill; they point to the small garden; they ask you to listen to a bird song rising out of the woods which runs from the terrace behind the house; they speak of the relief from the rush and heat of the not-too-distant Monumental City. And the visitor, catching a bit of the contagious spirit of well-being that pervades Ivy Hill, soon forgets that his question was one of dollars and cents.

Since the beginning of the forestry operations, the Hoffmans have sent 100 cords of pulpwood to the mill and have another 25 cords ready to go. To the sawmill, they have so far taken 300 logs from 575 trees marked for cutting. All this from just 20 acres of the forest. In fact, the 20 acres marked for initial cutting will yield from 75 to 100 thousand board feet of lumber or 500 cords of pulpwood. The important thing from the standpoint of the Hoffmans' interest in forestry is that this yield will result in an improved stand. Only the dead, dying, deformed, suppressed and mature trees are being taken out.

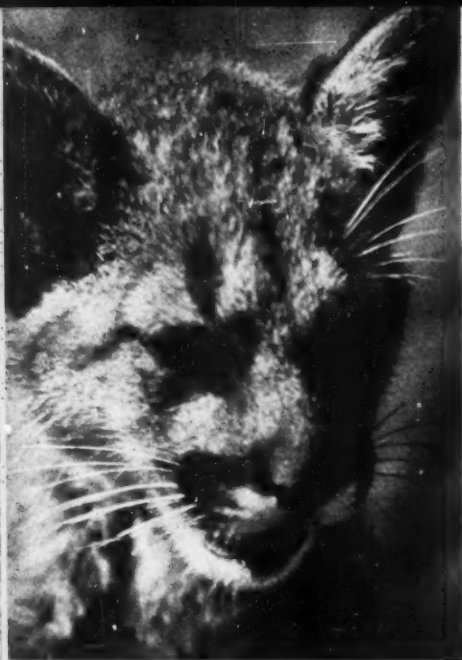
While the major work on the Ivy Hill enterprise is now confined to 20 acres, the management plan calls
(Turn to page 432)



Only 20 of Ivy Hill's 100 acres of forest have been marked for cutting. Mature and inferior trees are removed to improve the stand

Father and son, with the help of a neighbor, loading pulpwood—part of the 100 cords so far harvested from the initial working area





Young puma—known also as mountain lion, panther, cougar

MOST, if not all, of the mammals now found upon the earth are capable of making vocal sounds, such as a whistle, howl, bark, snort, yap, grunt, chirp, whine, or screech. They are heard at times when certain conditions cause an animal to voice an emotion, in many respects as do humans.

Of the larger North American mammals, the wolf sends forth a howl that will long be remembered by anyone fortunate enough to hear it in the wilds. As one authority wrote in 1905, it is "entirely unlike that made by any other living creature; it is a prolonged, deep wailing howl, and perhaps the most dismal sound ever heard by human ear."

Yet, to some, it is a moot question whether the howl of the wolf makes a greater impression on a human being than the scream of the puma, or as some authors favor, the American mountain lion. Also known colloquial-

...On the Scream of the Puma

By

STANLEY P. YOUNG

ly as cougar, panther, painter, catamount, wildcat, American lion, silver lion, California lion and tiger, the puma (its Peruvian name) has a wide range in the western hemisphere. Twenty-five sub-species or geographic races are now recognized throughout its American range, which includes the greater portion of the area extending northward from Patagonia in South America, to the Peace River District of northern British Columbia, in Canada. It is found throughout Central America, and all parts of South America to the Straits of Magellan.

In the United States it originally occurred in every state, but is now extinct east of the Mississippi River with the exception of Florida, where it exists in limited numbers. It is found in greatest abundance in the Rocky Mountain States, southward into Arizona, Texas, and New Mexico, and along the Pacific coast in California and Oregon. This range makes the animal somewhat unique in that it apparently can endure the extreme cold of severe winter as found in the Rocky Mountain area as well as the humid heat of the swamps and canebrakes in the tropical or subtropical regions.

As to whether or not the howl of the wolf makes a greater impression than the scream of a puma—few people have been fortunate enough to have heard either or both. The trait of the American puma to voice a sound that resembles the scream of a human female in severe distress or pain has long been the cause of much discussion. Consequently, two schools of thought are to be found. There are those who state emphatically that the puma does not scream, and an-

other group of individuals who affirm that it does.

At times the pros and cons have consumed much printer's ink. Persons who have vouched for the scream have been accused of being afflicted with "camp indigestion" caused by too many baking-powder biscuits, and therefore unable to distinguish one wild animal cry from another. The puma's scream has been likened to "wilderness mythology." Also, anyone claiming to have heard this predator scream has been branded a "tenderfoot, a person of guileless credulity," or the victim of an "active auditory imagination." Many have claimed that the scream of a loon has been mistaken for that of a lion, for "two or three loons on a mountain lake in the dead of night can certainly make an unearthly and terrifying racket to unaccustomed ears."

In the course of extensive field studies of this large cat, and much research in the course of preparing a faunal publication on the animal, I find no previous attempt has been made to bring together some of the early citations and personal field experiences and observations, all tending to verify the fact that the puma does, among its other vocal sounds, make a piercing scream.

American zoology and natural history had much of its solid foundation laid in the beginning of the nineteenth century in the work of Thomas Say and his contemporaries, as well as other early American naturalists who followed. Thus, it is of interest to note their observations recorded during the past 118 years on the puma and its sounds or cries.

On a cross-country trip from the



Missouri River to the Pacific Northwest in the early 1830's, John K. Townsend camped one night near the present-day Idaho-Oregon boundary.

"Last evening as we were about retiring to our beds," he wrote, "we heard, distinctly as we thought, a loud halloo, several times repeated, and in a tone like that of a man in great distress. Supposing it to be a person who had lost his way in the darkness, and was searching for us, we fired several guns at regular intervals, but as they elicited no reply, after waiting a considerable time, we built a large fire as a guide, and lay down to sleep.

"Early this morning a large panther was seen prowling around our camp, and the hallooming of last night was explained. It was a dismal distressing yell by which this animal entices its prey until pity or curiosity induces it to approach to its destruction.

Zadock Thompson has long been recognized as one of the early authorities on Vermont. Writing of the puma and calling it by one of its other names, the catamount, he commented:

"During the day the catamount usually lies concealed, but in the night prowls for his prey, and in early times his peculiar cry has often sent a thrill of horror through a whole neighborhood."

While serving as surgeon and naturalist to the Sitgreaves Expedition of 1851 down the Zuni, Little Colorado and Big Colorado rivers, S. W. Woodhouse recorded, "The cry of the panther . . . was occasionally to be heard." This was while Woodhouse was camped near San Francisco Mountain, near the present city of Flagstaff, in northern Arizona.

Two of the earlier naturalists in the Pacific Northwest, George Suckley and J. G. Cooper, related of the puma while they were working in the then Washington Territory: "They are said to utter shrill screams and at times loud whistling sounds at night. Perhaps these, when much heard, proceed from the amatory conflicts and spiteful sanguinary courtships which, it is fair to suppose, exist as much among them as with their cousins, our domestic dependents."

In the course of the famous Hayden Surveys in the far West, J. H. Batty at times served as taxidermist to these expeditions in the natural history work that was simultaneously

carried on. Batty voiced the opinion, based on his field observations, that "when the cougar is hungry he will hang around the hunter's camp during the night, seldom coming nearer than 100 yards and occasionally giving his dismal howl, which is fearfully distinct to the ear of the hunter. He generally gives the last one gradually dying out and sounding as if he was at your side. His howls sound like 'O-o-o-Oh! O-o-o,' repeated three times in succession. In fact the howl of the panther at night makes one more nervous than seeing the animal by day."

One of the most vivid descriptions is from Casper W. Whitney's account of the puma wherein he records: "Their cry is as terror-striking as it is varied. I have heard them wail so you would swear an infant has been left out in the cold by its mama; I have heard them screech like a woman in distress; and again, growl after the conventional manner attributed to the monarch of the forest. The average camp dog runs to cover when a cougar is awakening the echoes of the mountain. I should call it lucky, for those who hunt with dogs, that the lion does not pierce the atmosphere by his screeches when being hunted; for if he did, I fear it would be a difficult matter to keep dogs on his trail. There seems to be something about his screeching that particularly terrorizes dogs."

In the records of the Kansas Academy of Sciences are found many observations of J. R. Mead. This plainsman's opinion was that the puma when in full voice produced an "unearthly scream," and when made "close at hand will almost freeze the blood in one's veins, and for an instant paralyze almost any form of man or beast. My horses and mules tied to a wagon usually paid no attention to wild animals; but on this occasion they trembled like a leaf. Some Indian women and children were sitting around their camp fires. They screamed and ran into their lodges."

Mead, with respect to the foregoing is describing the scream of the puma as he heard it in January, 1868, while camped on the Cimarron River near the mouth of Turkey Creek, in what is now Woods County in northwest Oklahoma. He enlarges upon this further by stating "A panther's scream heard in the wilderness on a still night is an experience never to

be forgotten. The memory of it will stay with one to the end" . . . and that according to William Matthews, his former partner, the puma has "other tones of voice to suit the occasion as other cats have . . ."

Theodore Roosevelt, in his field observations of the puma, states: "I am not sure that I ever heard one; but one night while camped in a heavily timbered coulee near Killdeer Mountains (North Dakota), where, as foot-prints showed the beasts were plentiful, I twice heard a loud, wailing scream ringing through the impenetrable gloom which shrouded the hills around us. My companion, an old plainsman, said that this was the cry of the cougar prowling for its prey. Cer-



"His unearthly scream," said an early authority, "will freeze the blood in one's veins . . . will paralyze man or beast"

certainly no man could well listen to a stranger and wilder sound."

The late Doctor Edward W. Nelson, third chief of the old Bureau of Biological Survey, probably knew the puma and its habits as well as any naturalist. Few men excelled him in field work connected with the advancement of our knowledge of natural history. During his early work

(Turn to page 442)

Here is new fuel to feed the fire of an old argument: Does the puma, or mountain lion, scream?—or are the spine-tingling cries attributed to him just wilderness mythology?



WOODEN BOATS

of Ecuador

By L. V. TEESDALE

THE Spanish conquistadors had been in the Caribbean Islands and adjacent mainlands some years when, hearing of the riches of the Incas, they built ships at Panama, invaded Peru, and after a short blitzkrieg were in command of the west coast of South America. For more than 200 years after this conquest, all commerce and travel between Spain and the west coast, and including some with the Philippines, was by way of the Caribbean with overland trans-shipment at Panama. The ships used for this traffic in the Pacific were built locally.

The west coast of South America has few natural harbors; shipping depends upon open roadsteads along 2,500 miles of the coast of Peru and northern Chile. Furthermore, there is no timber along that portion of the coast suitable for shipbuilding. The Guayas River in Ecuador, however, makes an excellent harbor and drains an area well supplied with various woods which are excellent for use in ships. Consequently, Guayaquil became a center for ship construction and repair shortly after the Spanish occupation in 1535. In 1602, the industry was well established, and in that year two large galleons were launched for the Spanish government.

Shipbuilding presented many problems in those days. Logs and timbers were brought in from the nearby forests and worked into required shapes and sizes with ax, adze, saws and other hand tools. Records dating about 1750 mention that the bulk of the iron required was imported from Spain at great cost, though a poorer quality for limited uses could be obtained from Mexico. Tar and pitch were also brought from Mexico.

Hemp for cordage was grown in Chile, cotton for canvas in Peru, and tallow was obtained from cattle raised locally or imported from Chile. Underwater caulking was made of fiber from coconut husks;

above the water line hemp was used. Pulleys and deadeyes were made of local wood. The records frequently refer to iron nails and bolts, but no mention is made of wood treenails and presumably they were not used. Both slave and free labor was used in the shipyards. Some of the ships were of good size for that period, including galleons of 850 tons and warships of 60 guns.

Apparently these boats were sturdily constructed of durable materials, as many were in service a half century or more. One, the *Christo Viego*, built in 1650, is reported to have been in perfect condition when lost "by accident" in 1736. It would also appear that damage from marine borers was less common than today.

Guayaquil continued to be an important shipbuilding center until steel displaced wood in ocean-going vessels. Though greatly reduced, the industry has continued to serve local demands for coastal and river boats of from 70 to 200 tons. Much of the actual construction, however, has been transferred to places nearer a timber supply or where labor is cheaper, such as Posorja, Bahia de Caraquez and Esmeraldas.

There has been little incentive to build railroads and highways in the coastal zone and along the valley of the Guayas River and its tributaries, since so large a portion of the area can be reached and served by boats. Water transportation, though slow, is economical, and the weather is mild, violent storms being almost unknown.

As Guayaquil is the chief port of Ecuador and most of the exports and imports clear through that city, a sizeable fleet of vessels is required to handle the coastal and river traffic. Many of the river launches and barges and a few of the larger coastal boats are built of steel, but the bulk of the traffic is still in wooden boats ranging from small dugouts, or *canoas*, carrying one or two tons, to passenger and cargo boats of 200 tons or more.

The passenger boats which operate on established runs and schedules, use gasoline or Diesel engines for power. The cargo vessels are invariably sailboats, usually cutter or schooner rigged and ranging from 70 to 120 tons. Owing to light winds and ocean currents along the coast, and the tidal currents in the rivers, many of these sailboats are equipped with auxiliary power.

One would naturally expect that where boats are in such general use the boatbuilding industry, established

After four hundred years, coastal and river craft are still built the hard way—with ax, adze, saw and other hand tools

for 400 years, would be well developed, that timber and planking would be cut in sawmills, and that power machinery and labor-saving tools would be in use. Some small yards in Guayaquil do have a limited amount of power equipment. However, most of the wooden boats are built on some foreshore or beach on a handicraft basis, the same general methods of obtaining raw materials and for working and shaping the parts of the vessel being employed as were used 400 years ago when boats were first built on this coast. Of course, nails, bolts and spikes are now of steel and, along with sailcloth,

rope, rigging and ship chandlers' supplies are obtained from a variety of sources. Too, the boats have a modern rig in place of one of the old Spanish or Mediterranean rigs of earlier days.

Near the mouth of the Guayas River at Posorja, a sandy beach drops off fairly fast into deep water. This foreshore is considered an excellent site for shipbuilding, and it is there that most of the local wooden boats are built. Since the soil is firm, the keels can be laid on blocks, with the boats shored up as construction proceeds and launched sidewise into the bay at high tide. For repair



A 70-ton coaster under construction. Woods used are mainly mangle, a mangrove of great size, guayacan, black laurel and amarillo

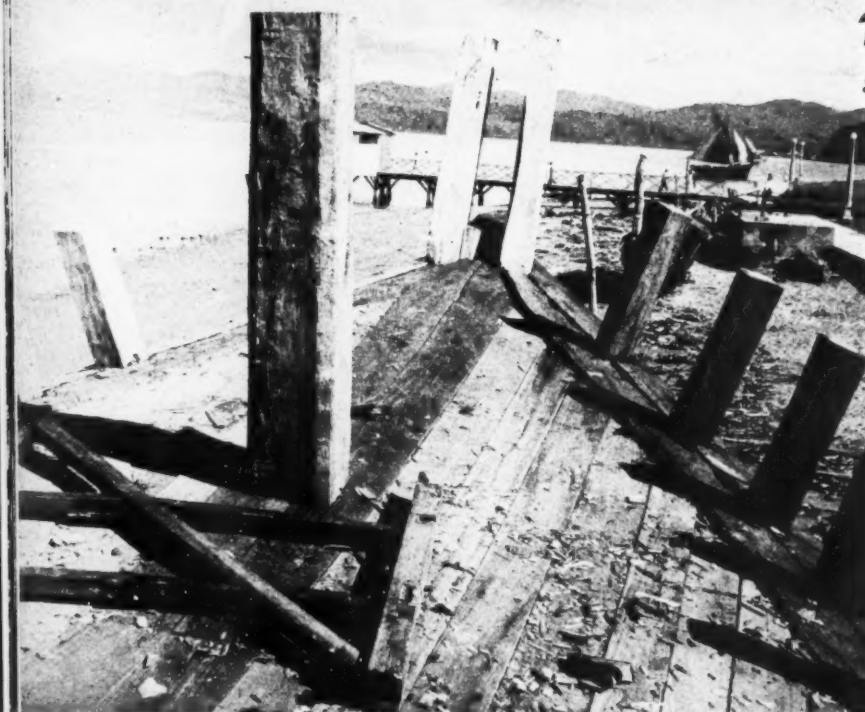
Small cargo vessels are invariably sailboats, equipped with auxiliary power. Mangle keels must be replaced in three to eight years





Deck framing of a cargo ship. Although beams are hand hewn and rough, contact surfaces are carefully shaped and well joined.

Decking of black laurel, claimed locally, along with amarillo, to be superior to Douglasfir, particularly in resistance to marine borers.



work, this foreshore is also preferred to that of the main river, where the soft mud offers poor support for boats and workmen.

As a member of the United States mission investigating the forest resources of Ecuador in 1943, the writer had opportunity to observe boats being built by primitive methods used centuries ago. One, under construction at Posorja, was an auxiliary Diesel schooner, 79½ feet long, with a 24½ foot beam and a 10 foot depth of hold, and was intended to draw about nine feet of water. The owner claimed it would carry about 200 "pay" tons of cargo. The Diesel engine might sound like an off-key note, but actually it does not affect the method of construction except to add the engine foundation and a shaft hole through the skeg. Boats of this type have fixed sizes for all parts and are highly standardized. Generally they are built without plans.

The stock of timber on hand at Posorja is comparatively small, usually limited to mangle, a species which, according to local opinion, gives best service if it is stored under water for six months after felling. Unlike most mangroves, mangle grows very straight and to great size in the coastal salt water swamps. It is very heavy, strong and moderately durable.

Men are sent into the nearby hills to obtain natural crooks of such "incorruptible" species as guayacan, guachapeli and madera negra for stem, sternposts, frames, deck beams and knees. These parts are selected in the standing tree for their particular use in the finished boat, crooks being selected that are best suited to each member. After felling, the parts are worked and shaped to rough dimensions to reduce weight before being taken from the forest.

Other squared logs or timbers of amarillo and black laurel are brought in from more distant forests, whip-sawn into planking and decking, and stacked for air seasoning. Thin material for deck houses, in this case roble, is obtained from a sawmill if possible; otherwise it also is whip-sawn. Stringers, clamps and shelves are cut from mangle. Three months are required to assemble the material.

The keel consists of one full-length piece of mangle hand squared on all faces with an ax and adze, and without rabbets for the garboards, extending ahead of the stem and back of the rudder post like a rudder gudgeon. The keel is set up on substantial blocking and, being the most vulner-

(Turn to page 444)

REPORT of the FOREST RESOURCE APPRAISAL

As a public contribution to postwar reconstruction and handling of the nation's forest resources, The American Forestry Association on January 1, 1944, formally initiated a fact-finding survey of the forests and forest lands of the United States. Public-spirited citizens, along with state and private organizations concerned with better management of forest lands, made possible the undertaking through contributions aggregating more than \$225,000.

World War II, as the Directors of the Association had foreseen, exerted a profound influence upon forest conditions throughout the world. Evidence of its effect within the United States are now discernible in war drains upon the nation's wood supplies, in postwar world needs for wood, in increasing demands for wood throughout this country and in current limitations on construction and other civilian uses. These conditions emphasize with increasing sharpness the need for facts as to the condition of forest resources in relation to peacetime reconstruction, and postwar problems involved in conserving and developing the forest wealth of the nation.

The Forest Resource Appraisal was directed to these overall questions in order that the American people might be informed and thereby prepared to deal intelligently with postwar forest questions. This was done by making a critical appraisal of forest conditions, state by state. A staff of men well qualified by training and experience was assigned to determine conditions existing in different regions of the country. The project, which has involved two and one-half years of field work, is under the direction of John B. Woods. A five-man Project Committee of leaders of American forestry serve in an advisory capacity.

The report presented herewith is a summarization of the national findings of the Appraisal which, with other data and analyses, were the basis for the proposed program for American forestry developed by the Association's Forest Program Committee at its meeting in July (see August issue of *AMERICAN FORESTS*). The program and the report will serve as a guide to the American Forest Congress called by the Association for October 9, 10 and 11 in Washington, D. C., for the purpose of formulating a postwar program of national forestry.

REPORT OF THE FOREST RESOURCE APPRAISAL

By JOHN B. WOODS

Director

FOREWORD

Early in 1945, after the Forest Resource Appraisal had been under way for a year, we were advised by the Forest Service that it had decided to make a reappraisal of the forestry situation on its own account, reviewing and bringing up to date basic inventory data and sampling forest management, and obtaining other related information. It was suggested that the two agencies might cooperate in securing basic data, while independent work done by each in gathering other information should lead to valuable comparisons.

The American Forestry Association undertook to cooperate in accordance with this invitation and had a comparatively small but useful part in photo interpretation and field checking done by the Forest Service. At the same time, the Appraisal staff of AFA has made numerous independent checks of various Forest Service findings. In several states the Forest Resource Appraisal has done original photo interpretation and ground checking, and some of these findings have been adopted by the Forest Service.

In presenting the following material it is desirable to explain that area and volume data of the U. S. Forest Survey have been adopted in those cases where we regard them as more accurate than our own. We have held to our own figures where we feel that our results are equally good or better. Since practically all such findings are estimates and since in the matter of wood volumes it is doubtful whether any estimate is accurate within a range of 10 percent, it is considered that minor revision of figures to bring them into absolute agreement is undesirable.

In general timber drain figures are Forest Service findings based on Census and its own regional checks. Growth figures are also largely those arrived at by the Forest Service, modified in certain states, however, by our men in accordance with their own studies. Obviously we cannot make specific acknowledgment of the helpful material used or the active assistance given by private individuals, state and federal officers. All have been generous in every way and The American Forestry Association is deeply grateful.—J. B. W.

WAR AND THE NATION'S FORESTS

FOUR YEARS of national emergency placed upon the forests of America about the same burden as might have been felt during a similar peacetime period of strong demand and good prices for wood products. The forest industries made herculean efforts to meet abnormal war needs, but were hampered by growing shortages of labor, operating supplies and equipment replacements.

Comparison of domestic lumber and pulpwood production, as reported for two consecutive four-year periods, indicates the extent to which operations were increased despite many difficulties:

| YEAR | LUMBER OUTPUT (In Board Feet) | PULPWOOD OUTPUT (In Cords) |
|---------------|----------------------------------|-------------------------------|
| 1938 | 23,400,000,000 | 7,900,000 |
| 1939 | 28,800,000,000 | 9,686,000 |
| 1940 | 31,200,000,000 | 12,307,000 |
| 1941 | 36,600,000,000 | 14,177,000 |
| Prewar Period | 120,000,000,000 | 44,070,000 |
| 1942 | 36,300,000,000 | 14,908,000 |
| 1943 | 34,300,000,000 | 13,581,000 |
| 1944 | 32,900,000,000 | 15,349,000 |
| 1945 | 27,900,000,000 | 15,315,000 |
| War Period | 131,400,000,000 | 59,153,000 |

Note — During the actual war years lumber consumption exceeded output and inventories were all but extinguished.

Sources—Unpublished estimates by U. S. Forest Service based on Census data.

Virgin timber and big sawmills, which had easily carried the burden of increased lumber production during the first World War, had become scarce in the territory east of the Rocky Mountains. Western loggers labored mightily to keep their dependent plants in operation, aided materially by increased sales of federal and state timber. Throughout the East, existing large operations were pressed to their production limits, and considerable volumes of stumpage were released upon certain national forests. Most noticeable, however, was the increased output of lumber and pulpwood from farmers and itinerant operators working in their own and their neighbors' small timber tracts.

Prices were up and quality requirements down, making profitable the removal of many defective and otherwise inferior trees, an opportunity widely seized upon in the hardwood regions. On the other side of the ledger, close cutting frequently removed the last seed trees from stands previously worked over. Federal wood procurement men occasionally promoted "destructive" logging on private lands in their zeal for increased production. In the big woods of the West there was some back-sliding from notably high timber harvesting standards set by the forest industries in the late 1930's. Shorthanded state forestry departments had difficulty maintaining their patrol and inspection services on effective footing. Forest Service cutting policies were relaxed somewhat to permit overcutting on several national forest units.

Need for Timber Continues

The war behind us, America faces a continuing need for timber in many forms. Lumber inventories are non-existent

in sawmill as well as retail yards. Civilian construction of all kinds is in arrears, and most industrial and manufacturing users of wood have less than they need. To meet their 1946 requirements, railroads hope to purchase 55 to 60 million crossties, and public utilities desire 6 to 7 million poles.

The U. S. Forest Service estimates that 32 billion board feet of lumber will be consumed here in 1946, increasing to 37 billion in 1947, and hanging at about 40 billion board feet each year for the following three years. Making due allowance for probable other demands upon timber of saw-log size, these estimates suggest sawtimber consumption of 46 billion board feet during 1946, approximately 53 billion board feet in 1947, and 59 to 60 billion for each of the following three years. Natural destructive agencies will take an additional four billion feet annually.

Since it is unlikely that any considerable relief may be expected from imports, these yearly drains, to whatever extent they materialize, will bear directly upon the forests of the United States.

In the past, we have been net exporters of sawn lumber and timber. Both Europe and Asia will need wood in quantities at least comparable with their gross prewar demands (although differently distributed as to countries). If and when restrictions of various kinds are cleared away, such demands may add three to five billion board feet of drain.

Pulpwood requirements, already at 20 million cords a year, are expected to increase to 26 or 27 million cords and, in the opinion of Forest Service experts, after allowing for imports, this will mean a yearly drain of 19 million cords from American forests. Normally more than half of the pulpwood produced here comes from sawtimber trees.

Such possibilities raise certain vital questions: Assuming that production approximates demand during the immediate postwar period, what will be the effect of such cutting upon present forest growing stocks and upon production 10 or 20 years hence? What measures can be taken now or in the future to assure adequate supplies of wood and decent rewards for its producers?

There is strong encouragement for private forestry in such prospects, for if demand continues, even at levels of the past five years, forest management is practicable upon all private and most public forest lands. Future wood supplies can be made secure through full use of America's vast land area and tremendous tree growth potential. Yet the problem is far from simple; many divergent ownership interests are concerned; there is strong competition for the wood that grows; and in the matter of public aids and controls conflicting philosophies are involved. Furthermore, even though the future be bright at long range, the immediate postwar years must be lived through.

THE FOREST INVENTORY

Six times in 40 years, American foresters have made careful objective estimates of the country's forest resources (R. S. Kellogg, 1908; U. S. Department of Commerce, 1913; Capper Resolution Study, 1920; Copeland Resolution Study, 1932; and Joint Congressional Committee Study, 1938). This present project, begun early in 1944 and carried through to completion, with substantial assistance from the U. S. Forest Service (engaged since early 1945 in its own reappraisal), thus becomes number six upon the list.

Commercial forests are growing or could be grown upon 465,094,000 acres in the United States, or about one-quarter of its land area. There is tree growth upon 656,374,000 acres; the difference being accounted for by considerable reservations from commercial use (state and national parks, wilderness areas, etc.), by large, open type woods in the Southwest, and by alpine and other non-commercial stands.

Of the commercial forest area, 19 percent is in federal ownership or control; states, counties and municipalities hold 6 percent; farm woodlands amount to 30 percent, and industrial and other ownerships total 45 percent.

There is standing upon this commercial forest area 1,620,824,000,000 board feet of sawtimber, of which 80 percent is softwoods and the remainder hardwoods. However, 72 percent of all sawtimber is situated west of the Mississippi River, upon 35 percent of the commercial forest land, as a result of nearly a century of large scale logging and sawmilling in the eastern states. This also accounts for the fact that these once cutover lands in the East today support 70 percent of all our young timber volume.

To put it another way, the West accounts for slightly less than half of our 197,962,000 acres of sawtimber stands, while the East has the bulk of the smaller and younger stands. For example, two-thirds of the 111,252,000 acres of pole size trees are in the East, as are three-fourths of the 82,597,000 acres of saplings and seedlings. And of the 73,283,000 acres of unstocked land, five out of seven lie east of the Mississippi.

The total sawtimber volume appears to compare favorably with the most recent previous estimate (1938) of 1,763,651,000,000 board feet. For about 330 billion board feet of sawtimber have been removed from the forests meanwhile, plus 30 to 35 billion feet lost by fire, wind, insects and disease. Yet the difference is greater than it seems, for standards of classifying timber as big enough for commercial milling are steadily being lowered. Furthermore, it is quite likely that estimates made in 1938 were far below actual volumes present in a number of states where ground surveys had not been made prior to that time.

Problem of the Less Favored Species

America's primeval forests contained many tree species, variously endowed with physical characteristics affecting their usefulness, and in certain of the timbered regions of the country a long standing industry problem of marketing less desired species still persists. In the East all softwood species which occur in important volume are now merchantable for one use or another. Hardwoods have been in great demand during the war, yet producers may soon face once more the problem of what to do with defective trees and particularly with the so-called inferior species.

Timber operations in the northern Rockies have long been subject to buyers' preference first for white pine, then for ponderosa pine, with Douglasfir, larch, spruce and lodgepole pine having only limited sale, even though they are more plentiful. West of the Cascades, where Douglasfir reaches its best development, it is (next to Port Orford cedar) the most favored species; spruce, redcedar and (recently) hemlock are acceptable among the plentiful conifers, while most of the equally abundant true firs are desired only for pulping. Redwood operators usually ignore the so-called "white woods" (ponderosa pine, Douglasfir, true firs) which occur in mixture with redwood upon the slopes of their region.

This is a challenging and serious question which foresters and the forest owners for whom they work will need to face immediately. Species assortments in today's forests are not favorable to continuation of these preferences. Fine trees of the most desirable species will always be saleable, and foresters will do well to grow them, but for the present the urgent need is to find outlets for the trees that are in the woods, including the species which customers prefer not to take. War's stringencies have broken down these preferences somewhat, and it is to be hoped that such gains can be held. Research in utilization and strong sales promotion will help, as they did with the formerly despised western hemlock.

TABLES

TABLE 1—REGIONAL SUMMARY: LAND AREA,
BY MAJOR USE CLASSES

(Thousand Acres)

| Region | Total Area | Forest Area | Cropland Area | Pasture Area | Other Area |
|-------------------|------------|-------------|---------------|--------------|------------|
| New England | 40,451 | 31,092 | 5,180 | 1,321 | 2,858 |
| Middle Atlantic | 87,353 | 44,214 | 27,591 | 6,612 | 8,936 |
| Central | 191,129 | 44,935 | 115,189 | 10,672 | 20,333 |
| Lake | 122,718 | 55,700 | 47,911 | 5,881 | 13,226 |
| South Atlantic | 76,362 | 45,216 | 21,523 | 3,360 | 6,263 |
| Southeast | 162,058 | 96,166 | 44,143 | 5,730 | 16,019 |
| West Gulf | 275,334 | 109,535 | 81,745 | 49,066 | 34,988 |
| Plains | 195,428 | 4,833 | 109,878 | 52,927 | 27,790 |
| Northern Rocky | 209,043 | 51,929 | 23,010 | 56,167 | 77,937 |
| Southern Rocky | 339,971 | 72,655 | 21,089 | 61,432 | 184,795 |
| Pacific Northwest | 104,529 | 53,855 | 12,435 | 14,112 | 24,127 |
| California | 100,354 | 46,244 | 11,899 | 9,204 | 33,007 |
| United States | 1,904,730 | 656,374 | 521,593 | 276,484 | 450,279 |

TABLE 2—REGIONAL SUMMARY: FOREST LAND AREA,
BY BROAD CLASSES

(Thousand Acres)

| Region | Total Forest Area | Non-commercial Forest | | |
|-------------------|-------------------|------------------------|-----------------|------------------------|
| | | Commercial Forest Area | From Timber Use | Valuable for Other Use |
| New England | 31,092 | 30,851 | 165 | 76 |
| Middle Atlantic | 44,214 | 41,586 | 2,489 | 139 |
| Central | 44,935 | 43,804 | 402 | 729 |
| Lake | 55,700 | 50,345 | 1,138 | 4,217 |
| South Atlantic | 45,216 | 43,697 | 546 | 973 |
| Southeast | 96,166 | 91,195 | 595 | 4,376 |
| West Gulf | 109,535 | 53,073 | 41 | 56,421 |
| Plains | 4,833 | 4,233 | 115 | 485 |
| Northern Rocky | 51,929 | 27,919 | 2,811 | 21,199 |
| Southern Rocky | 72,655 | 15,782 | 1,883 | 54,990 |
| Pacific Northwest | 53,855 | 46,204 | 1,504 | 6,147 |
| California | 46,244 | 16,405 | 709 | 29,130 |
| United States | 656,374 | 465,094 | 12,398 | 178,882 |

TABLE 3—REGIONAL SUMMARY: OWNERSHIP OF
COMMERCIAL FOREST LAND

(Thousand Acres)

| Region | National Forests | Other Federal | Indian Forests | State and County | Farm and Woodlands | Industrial and Other |
|-------------------|------------------|---------------|----------------|------------------|--------------------|----------------------|
| New England | 822 | 69 | --- | 666 | 6,477 | 22,817 |
| Middle Atlantic | 1,265 | 197 | --- | 3,613 | 12,001 | 24,510 |
| Central | 1,951 | 58 | 1 | 371 | 25,721 | 15,702 |
| Lake | 5,455 | 135 | 905 | 14,805 | 13,930 | 15,115 |
| South Atlantic | 2,781 | 707 | 48 | 565 | 21,577 | 18,019 |
| Southeast | 3,802 | 2,096 | 10 | 1,224 | 34,387 | 49,676 |
| West Gulf | 3,460 | 754 | 403 | 318 | 13,536 | 34,602 |
| Plains | 948 | 31 | 250 | 8 | 2,917 | 79 |
| Northern Rocky | 17,143 | 1,042 | 907 | 1,698 | 2,703 | 4,426 |
| Southern Rocky | 10,765 | 570 | 1,110 | 380 | 1,498 | 1,459 |
| Pacific Northwest | 17,341 | 2,856 | 2,815 | 3,435 | 3,334 | 16,423 |
| California | 7,684 | 273 | 142 | 37 | 1,303 | 6,966 |
| United States | 73,417 | 8,788 | 6,591 | 27,120 | 139,384 | 209,794 |

TABLE 4—REGIONAL SAWTIMBER SUMMARY

(Millions of Feet B. M. Equivalent to Lumber Tally)

| Region | Total | Softwoods | Hardwoods |
|-------------------|-----------|-----------|-----------|
| New England | 58,197 | 33,263 | 24,934 |
| Middle Atlantic | 62,045 | 14,017 | 48,028 |
| Central | 55,689 | 2,178 | 53,511 |
| Lake | 51,453 | 16,680 | 34,773 |
| South Atlantic | 96,205 | 54,997 | 41,208 |
| Southeast | 132,162 | 78,172 | 53,990 |
| West Gulf | 116,983 | 59,207 | 57,776 |
| Plains | 8,400 | 3,282 | 5,118 |
| Northern Rocky | 124,363 | 123,427 | 936 |
| Southern Rocky | 56,868 | 55,952 | 916 |
| Pacific Northwest | 630,894 | 626,941 | 3,953 |
| California | 227,565 | 227,565 | --- |
| United States | 1,620,824 | 1,295,681 | 325,143 |

NOTE: Approximately 100 billion board feet (65 percent softwoods) of the above stand is not available, because it is in under-sawtimber size stands.

TABLE 5—AREA OF COMMERCIAL FOREST AND STAND OF
SAWTIMBER THEREON, BY STATES

(Equivalent to Lumber Tally)

| State and Region | Commercial Forest Area M Acres | Total Sawtimber MM Bd. Ft. | Softwood Sawtimber MM Bd. Ft. | Hardwood Sawtimber MM Bd. Ft. |
|------------------|--------------------------------|----------------------------|-------------------------------|-------------------------------|
| Connecticut | 1,900 | 1,642 | 258 | 1,384 |
| Maine | 16,665 | 36,787 | 24,279 | 12,508 |
| Massachusetts | 3,297 | 4,670 | 1,946 | 2,724 |
| New Hampshire | 4,722 | 7,610 | 3,424 | 4,186 |
| Rhode Island | 447 | 153 | 22 | 131 |
| Vermont | 3,820 | 7,335 | 3,334 | 4,001 |
| Delaware | 442 | 1,183 | 519 | 664 |
| Maryland | 2,722 | 4,030 | 1,779 | 2,251 |
| New Jersey | 2,329 | 2,188 | 783 | 1,405 |
| New York | 11,114 | 25,279 | 6,926 | 18,353 |
| Pennsylvania | 15,127 | 20,582 | 3,087 | 17,495 |
| West Virginia | 9,852 | 8,783 | 923 | 7,860 |
| Illinois | 3,421 | 9,396 | 48 | 9,348 |
| Indiana | 3,302 | 6,175 | 6 | 6,169 |
| Iowa | 2,226 | 5,344 | 43 | 5,301 |
| Kentucky | 11,694 | 12,392 | 1,611 | 10,781 |
| Missouri | 18,382 | 13,247 | 397 | 12,850 |
| Ohio | 4,779 | 9,135 | 73 | 9,062 |
| Michigan | 17,380 | 24,883 | 8,410 | 16,473 |
| Minnesota | 16,700 | 11,590 | 4,940 | 6,650 |
| Wisconsin | 16,265 | 14,980 | 3,330 | 11,650 |
| North Carolina | 18,537 | 41,121 | 25,245 | 15,876 |
| South Carolina | 10,783 | 29,764 | 17,750 | 12,014 |
| Virginia | 14,377 | 25,320 | 12,002 | 13,318 |
| Alabama | 18,800 | 32,287 | 21,210 | 11,078 |
| Florida | 19,449 | 17,308 | 12,862 | 4,446 |
| Georgia | 24,390 | 39,683 | 30,243 | 9,439 |
| Mississippi | 15,868 | 30,453 | 11,592 | 18,861 |
| Tennessee | 12,628 | 12,431 | 2,265 | 10,166 |
| Arkansas | 19,967 | 40,537 | 20,674 | 19,863 |
| Louisiana | 16,169 | 42,725 | 16,856 | 25,869 |
| Oklahoma | 5,887 | 4,415 | 2,943 | 1,472 |
| Texas | 11,050 | 29,306 | 18,734 | 10,572 |
| Kansas | 1,011 | 2,880 | --- | 2,880 |
| Nebraska | 987 | 1,500 | 300 | 1,200 |
| North Dakota | 470 | 434 | 20 | 414 |
| South Dakota | 1,765 | 3,586 | 2,962 | 624 |
| Idaho | 10,149 | 60,796 | 60,764 | 32 |
| Montana | 14,758 | 52,515 | 52,112 | 403 |
| Wyoming | 3,012 | 11,052 | 10,551 | 501 |
| Arizona | 2,815 | 16,270 | 16,270 | --- |
| Colorado | 7,874 | 27,658 | 26,742 | 916 |
| Nevada | 98 | 367 | 367 | --- |
| New Mexico | 3,465 | 8,471 | 8,471 | --- |
| Utah | 1,530 | 4,102 | 4,102 | --- |
| Oregon | 26,330 | 381,389 | 378,577 | 2,812 |
| Washington | 19,874 | 249,505 | 248,364 | 1,141 |
| California | 16,405 | 227,565 | 227,565 | --- |
| U. S. Total | 465,094 | 1,620,824 | 1,295,681 | 325,143 |

TABLE 6—REGIONAL SUMMARY: OWNERSHIP SAWTIMBER
(Million Board Feet)

| Region | Federal | State and Local | Farm | Industrial and Other | Total |
|-------------------|---------|-----------------|---------|----------------------|-----------|
| New England | 2,014 | 842 | 12,214 | 43,127 | 58,197 |
| Middle Atlantic | 1,863 | 3,877 | 15,855 | 40,450 | 62,045 |
| Central | 1,774 | 659 | 39,243 | 14,013 | 55,689 |
| Lake | 4,300 | 5,340 | 10,910 | 30,903 | 51,453 |
| South Atlantic | 6,130 | 1,427 | 47,003 | 41,645 | 96,205 |
| Southeast | 6,406 | 386 | 55,196 | 70,174 | 132,162 |
| West Gulf | 7,856 | 1,170 | 34,727 | 73,230 | 116,983 |
| Plains | 2,595 | 9 | 5,739 | 57 | 8,400 |
| Northern Rocky | 78,074 | 10,820 | 5,090 | 30,379 | 124,363 |
| Southern Rocky | 51,041 | 954 | 2,180 | 2,693 | 56,868 |
| Pacific Northwest | 358,501 | 39,210 | 10,700 | 222,483 | 630,894 |
| California | 104,192 | 247 | 15,331 | 107,795 | 227,565 |
| United States | 624,746 | 64,941 | 254,188 | 676,949 | 1,620,824 |

TABLE 7—REGIONAL SUMMARY: CONDITION OF COMMERCIAL FOREST: STOCKING

| Region | (Thousand Acres) | | | | Total Area |
|-------------------|------------------|------------------|--------------|----------------|------------|
| | Saw-timber Area | Pole Timber Area | Sapling Good | Seed-ling Poor | |
| New England | 13,895 | 8,116 | 5,503 | 3,337 | 30,851 |
| Middle Atlantic | 14,813 | 12,714 | 8,200 | 5,859 | 41,586 |
| Central | 14,646 | 14,610 | 7,473 | 7,075 | 43,804 |
| Lake | 6,235 | 8,829 | 21,609 | 13,672 | 50,345 |
| South Atlantic | 22,668 | 7,594 | 7,918 | 5,517 | 43,697 |
| Southeast | 37,724 | 21,327 | 11,658 | 20,486 | 91,195 |
| West Gulf | 28,286 | 12,855 | 6,475 | 5,457 | 53,073 |
| Plains | 1,661 | 1,220 | 706 | 646 | 4,233 |
| Northern Rocky | 11,422 | 9,654 | 5,263 | 1,580 | 27,919 |
| Southern Rocky | 9,417 | 3,434 | 1,577 | 1,354 | 15,782 |
| Pacific Northwest | 26,298 | 7,501 | 6,155 | 6,250 | 46,204 |
| California | 10,897 | 3,398 | 60 | 2,050 | 16,405 |
| United States | 197,962 | 111,252 | 82,597 | 73,283 | 465,094 |

TABLE 8—REGIONAL SUMMARY: EASTERN HARDWOODS AND EASTERN SOFTWOODS, SPECIES:
(Million Board Feet)

| Species | England New | Middle Atlantic | Central | Lake | South Atlantic | Southeast | West Gulf | Total |
|-------------------------|-------------|-----------------|---------|--------|----------------|-----------|-----------|---------|
| Eastern Hardwoods Total | 24,934 | 48,028 | 53,511 | 34,773 | 41,208 | 53,990 | 57,776 | 314,220 |
| Oaks | 2,265 | 19,012 | 28,452 | 5,287 | 12,815 | 20,087 | 20,927 | 106,845 |
| Beech, Birch and Maple | 20,740 | 19,310 | 7,796 | 16,566 | 2,330 | 1,032 | — | 67,774 |
| Red Gum | — | — | 626 | — | 6,667 | 9,964 | 9,083 | 26,340 |
| Tupelo | — | — | 421 | — | 6,250 | 7,524 | 6,790 | 20,985 |
| Yellow Poplar | 56 | 1,710 | 2,243 | — | 4,512 | 3,408 | 1,620 | 13,549 |
| Cottonwood and Aspen | 1,385 | 1,154 | 3,635 | 5,403 | 216 | 714 | 2,276 | 14,783 |
| Other Hardwoods | 488 | 6,842 | 10,338 | 7,517 | 8,418 | 11,261 | 17,080 | 61,944 |
| Eastern Softwoods Total | 33,263 | 14,017 | 2,178 | 16,680 | 54,997 | 18,172 | 59,207 | 258,514 |
| Southern Yellow Pine | 142 | 4,035 | 1,538 | — | 53,167 | 73,501 | 59,207 | 191,590 |
| Spruce and Fir | 20,649 | 2,718 | — | 3,668 | 40 | — | — | 27,075 |
| White and Norway Pine | 7,330 | 3,050 | 167 | 3,644 | 807 | 273 | — | 15,271 |
| Hemlock | 3,764 | 3,996 | 343 | 6,997 | 675 | — | — | 15,775 |
| Others | 1,378 | 218 | 130 | 2,371 | 308 | 4,398 | — | 8,803 |

TABLE 9—REGIONAL SUMMARY: WESTERN SOFTWOODS AND WESTERN HARDWOODS, SPECIES:
COMMERCIAL SAWTIMBER STAND

| Species | (Million Board Feet) | | | | | | Total |
|-------------------------|----------------------|----------------|----------------|-------------------|------------|---|-----------|
| | Plains | Northern Rocky | Southern Rocky | Pacific Northwest | California | — | |
| Western Hardwoods Total | 5,118 | 936 | 916 | 3,953 | — | — | 10,923 |
| Oaks | 650 | — | — | 584 | — | — | 1,234 |
| Cottonwood and Aspen | 2,414 | 936 | 800 | 377 | — | — | 4,527 |
| Red Alder | — | — | — | 2,000 | — | — | 2,000 |
| Bigleaf Maple | — | — | — | 725 | — | — | 725 |
| Others | 2,054 | — | 116 | 267 | — | — | 2,437 |
| Western Softwoods Total | 3,282 | 123,427 | 55,952 | 626,941 | 227,565 | — | 1,037,167 |
| Douglasfir | — | 26,718 | 3,470 | 331,227 | 68,227 | — | 429,642 |
| Ponderosa Pine | 3,275 | 23,912 | 26,865 | 80,198 | 51,547 | — | 185,797 |
| True Firs | — | 9,360 | 3,315 | 57,854 | 43,012 | — | 113,541 |
| Western Hemlock | — | 1,352 | — | 95,855 | — | — | 97,207 |
| Spruces | 7 | 12,492 | 15,361 | 8,020 | — | — | 35,880 |
| Lodgepole Pine | — | 14,406 | 6,483 | 1,171 | — | — | 22,060 |
| Sugar Pine | — | — | — | 4,146 | 19,535 | — | 23,681 |
| Western Larch | — | 17,879 | — | 8,727 | — | — | 26,606 |
| Western White Pine | — | 12,630 | — | 3,943 | — | — | 16,573 |
| Redwood | — | — | — | — | 38,114 | — | 38,114 |
| Others | — | 4,678 | 458 | 35,800 | 7,130 | — | 48,066 |

DEFINITION AND EXPLANATION

Such terms as sawtimber and pole-size timber have somewhat variable meanings. In general, sawtimber trees are trees from which merchantable sawlogs can be made; and sawtimber stands are stands containing sufficient such trees on an average acre to justify commercial operation. These standards vary from region to region. Pole-size trees usually are trees smaller than sawlog size and five inches or more in diameter at breast height. Pole-timber stands are stands in which such trees predominate and where the sawtimber volume is insufficient to justify commercial sawlog

operation. Lumber tally and International log scale, used herein for all eastern data, are regarded as identical. In the West, Scribner log scale has been used and addition made for over-run. Seedlings and saplings are trees under pole-size.

Much of the discussion is concerned only with sawtimber, expressed in board feet, and pole-size timber expressed in cords. Little use is made of cubic measure, because of difficulty of converting recognized commercial units (board feet and cords) to such an absolute and all inclusive unit.

There are other problems in our forests besides that of less desired species. In the West, the woods, private as well as public, are known to contain decaying veteran trees whose combined yearly losses to fungi offset all growth increases. Where fire or wind harvested old forests and new stands are growing up, starvation mortality claims its countless numbers of saplings. From these causes more than four billion board feet of wood is lost each year in the Douglasfir region. These forests should be managed so that the wood which grows can be utilized. Because they are mostly in remote mountainous country, the first step toward management must be to construct roads into them. In this government and private owners should join forces.

Poor Stocking Keeps Growth Rate Down

In the East, one difficulty is poor stocking; the land is not producing its maximum in trees because there are not enough stems present upon which to lay new wood. Another is the presence of defective and otherwise low grade hardwoods occupying space under ground and above which might be more profitably utilized by greater numbers of younger trees of desired species.

The unstocked areas, particularly in the eastern and southern states, represent a shocking economic waste. On much of this 73 million acres, planting is needed to secure prompt regeneration. Several million acres of plantations now growing begin to give indication of the practicability of creating timber wealth in this way. In most states farmers are offered planting stock at low cost. Various farm benefit programs are worrying at the fringes of this great problem. Yet the aggregate effort should be increased tenfold.

Altogether, the vast forest domain of America is like a fine machine that is idling. The challenge to foresters and owners is to put it to work. Nearly 40 percent of merchantable sawtimber volume is in federal control, while only five percent belongs to states and smaller subdivisions. Fifteen percent is in farm woodlands and 40 percent remains in industrial and other private ownership, including a great number of small holdings. It is evident that farm woodlots and forest industry timber tracts have borne by far the greater part of the commodity drain. Because more than 90 percent of all production comes from such sources, there continues to be heavy and steady reduction of these stands.

To supply future needs most of the non-operative holdings and particularly the non-productive public forests must come into production. It is to be hoped that management will be such as to utilize them fully without abusing them.

FOREST DRAIN VERSUS FOREST GROWTH

While, during the war years as in peacetime, lumber was the chief product of our forests, there were other drains of sawtimber-size material. Shingles, veneers, poles and piling, cooperage and hewn crossies were among the more important. Considerable volumes of sawtimber were burned as fuel. Probably half of all pulpwood produced came from trees large enough to be made into lumber. Altogether, it is estimated that 49.7 billion board feet of such material was taken from American timber stands for use in 1944, while no less than 4.2 billion feet were destroyed by fire, insects, disease and wind.

At the same time, there was heavy cutting in the nation's pole timber stands. Pulpwood, mine timbers, fence posts, small stock for various specialty uses, fuelwood; whether marketed in linear feet, pieces, tons or cubic measure, such material added up to an estimated drain of 31,732,670 cords. In this size class there were losses to natural destructive agencies of 8,876,512 cords (U.S.F.S. Re-appraisal).

While 1944 production for use was less than that in any of the three previous years, it exceeded 1945 output and co-

incides with the Forest Service estimate of prospective 1946 cut. Adding estimated current yearly losses, there is produced a convenient index of current drain, in the light of which to study the nation's timber supply position. Specifically, these totals are 53.9 billion board feet of sawtimber and 40,609,182 cords of pole timber per year.

In former times strong demand for products of the forest stimulated production until output eventually exceeded the absorptive capacity of markets. This came about through addition of extra work shifts in lumber plants and by the building of new conversion facilities—such increased production being supported by virgin timber stands. While lumbermen suffered most acutely from such “feast and famine” cycles, other forest industries were also noticeably affected.

Increased Production Must Come from Growth

Today the situation is changed. Outside the public forests there are relatively few opportunities for immediate expansion of timber conversion operations. In private holdings of the far West, new developments may keep pace with shutdowns caused by stumpage exhaustion; elsewhere they cannot. Actually, except for limited opening up of federal and state reserves to new operations, *future increases of production must come from growth!* Here is a real challenge to public foresters and private forest owners. It may also be a preventive of “feasts and famines.”

Already, in many parts of the United States, the major portion of wood output must come from stands which have been logged over in the past. Such cutting may be taken from current growth increment, or it may represent reduction of growing stocks. Since reduction of growing stocks also means reduction of annual growth, the relationship between actual growth and drain is of vital importance.

In general, the Forest Resource Appraisal has accepted estimates of the U. S. Forest Service both as to drain and yearly increment. In a few states, however, growth estimates have been revised upward. While overall or nationwide totals are in close agreement with those of the Forest Service, it is desirable to state the opinion that these estimates are conservative, even under present standards of management. As management improves they must be revised upward.

America's forests, as they are managed today, put on each year by growth an estimated total of 36 billion board feet of sawtimber and 66 million cords of wood of pole size. Usually, this annual increment is greatest where cutting is heaviest, thus emphasizing the fact that forests respond to management even when it is ruthless. The northern regions contribute nearly 24 percent of sawtimber growth, while claiming 27 percent of the forest area and 14½ percent of sawtimber volume. The South, with 40 percent of the area and 21 percent of volume, contributes 55 percent. The western regions possess nearly 65½ percent of the nation's sawtimber, upon 23 percent of the forest land, and contribute yearly less than 20 percent of the national growth increment.

Given Management, Growth and Drain Can Rise Together

While for the country as a whole, the yearly growth of wood of less than sawtimber size appears to be considerably in excess of drain, there is overcutting in certain localities, due to buying competition and disregard for silvicultural practices. Demand for wood in small sizes certainly stimulates tree growing, yet the uninstructed owner's recourse to clear-cutting rather than judicious thinning tends to reduce long range realization in both volume and quality.

An excess of sawtimber drain over growth, amounting for the country as a whole to a ratio of 3:2, if continued threatens to result in shortages that will seriously affect the national economy and bring disaster to certain regions.

It is assumed that yearly production must decline as growing stocks are reduced, even though one cannot predict with certainty the extent to which such reductions of timber stand will affect sawtimber production. Too many factors enter the equation.

Currently the relationship of sawtimber output to volume of sawtimber stand varies from .8 percent in the southern Rocky Mountain region to 8.9 percent in the Southeast. In the far western regions, drain exceeds growth because of so much unmanaged primeval forest. In the Great Plains, Central and Middle Atlantic areas, growth currently is more than sawtimber drain, while in New England, the Lake States and the three southern regions, drain exceeds current growth. At least rudimentary management is being applied in these areas and production is affected by timber accessibility, conversion facilities, market demands and prices, and owner attitudes.

There are indications that such sawtimber drains, unmodified as to origins and in the absence of strong remedial action (such as is proposed farther along in this report), can go on for three or four years without marked volume reduction. The most noticeable effects will be progressive deterioration of quality of the products, and impoverishment of timber stands. Thereafter, production will decline in all regions, although with varying rapidity.

Yet it is possible, by introducing intensive management and utilization, and redistributing the production load, to sustain such an output of wood *suitable for the various industrial uses*, without further damage to growing stocks. It would even be possible within a few years safely to increase the annual cut.

PRODUCTION ORIGINS AND INFLUENCES

War demands made imperative an increase in the proportional use of hardwoods. In 1944, softwoods made up 76 percent of lumber production, while hardwoods amounted to 24 percent. Hewn ties were divided evenly between the two. In utilization of pulpwood, by reason of technological advances, the percentage of hardwood rose steadily and now stands at about 15. While poles and piling continued to run almost entirely to treated softwoods, veneer logs were evenly divided. It is interesting to note that hardwoods are making their greatest gains in the pole-size material.

The geographical pattern of production still shows the influence of virgin timber stands, although to no such extent as was the case two decades ago. As Lake States and southern mills cut out, following the first World War, lumbering's center of gravity shifted westward, and an ensuing depression which well nigh extinguished demand, cloaked the enigma of stumpage supplies east of the Great Plains, while the forests of these regions quietly put on wood.

In 1944, the East was able to furnish 55 percent of the lumber cut, 40 percent coming from the 12 pine-producing states of the South. Yet, surprisingly, the Great Lakes, central and northeastern states produced 15 percent of the total cut, including nearly half of the hardwood. The Pacific Northwest continued to lead all western regions, with 30 percent of the total, while California showed an enterprising seven percent.

Early pulp manufacturers settled in all the northern regions where there was timber suited to their needs. And most of them remained, supplementing their own stumpage with locally bought wood and imports. When the tremendous kraft expansion came, the industry moved into the South where yellow pine grew rapidly. Forty-five percent of all present production comes from the 12 southern states. The Pacific Northwest is next, with 26 percent; the Lake States and New England are about on a level, with 12 percent each; the Middle Atlantic states produce four percent, and other regions contribute negligible amounts.

Round Products Can Help Forestry

Mining timber production is important in the great eastern coal regions and locally wherever there are deep mines. Props and lumber add up to possibly one percent of total consumption of sawtimber-size material. A much larger drain upon stands of pole size constitutes a present threat to future growth, which might be converted into a boon through selection of material cut so as to improve stands for future production of high grade sawtimber. Coal and other mining companies, already worried about shortages of such materials, would do well to increase quickly their employment of foresters to manage their extensive woodlands.

Fuelwood and fence posts are produced locally in every region, with some inter-regional movement of the latter. Desired improvements are: less use of high grade and large-size timber for fuel, through greater reliance upon large and small cull trees and woods and plant offal; expanded planting of species suitable for fence posts in farm woodlots everywhere. Incidentally, it should be noted that southern producers of treated materials market considerable numbers of pine (treated) fence posts, an additional outlet for thinnings from pine plantations and other young stands.

Conversion Facilities Are Unevenly Distributed

Most other commodities are produced widely over all the regions that bear suitable timber species. In some areas, lack of conversion plants prevents disposal of timber for desirable uses. Lumber and pole production might be greater in the Rocky Mountain regions if there were more sawmills and treating plants. There are places (Colorado and Utah, for example) where federal forests are stagnated and insect or disease ridden because conditions appear unfavorable for immediate operations. In such localities, the Forest Service might properly promote new industries by offering favorable long-term contracts and attractive stumpage price conditions.

On the other hand, there are localities so well supplied with plants that intense competition for timber results in overcutting. Many woodenware plants are competing for hardwood in parts of New England, while in certain southern states several pulp mills are drawing heavily upon the same producing territory.

The pattern being a patchwork, one asks whether the result is good or bad and what might be done to provide markets where there are none, and avoid destruction of growing stocks by reason of overconcentration of wood-using plants. Several possibilities appear. State forestry agencies, assisted by industry groups and, where desirable, by federal foresters, might profitably study the relationship between supply of wood and conversion facilities throughout their states. Where possibilities for new plants actually exist it usually is comparatively easy to arouse interest among manufacturers.

It may be that the problem of over-development can be dealt with effectively by limiting the number and kind of conversion plants. Invasion of territory by foreign (out of state) concerns often destroys the timber supply of long established local plants. The principle of licensing certain types of business firms is firmly established in many states and might be extended to apply to wood conversion facilities, if local public opinion were aroused to support such a step. State forestry agencies might be charged with the task of fitting plant facilities to wood supplies.

Marketing Is a Serious Problem

Many forest owners—farmers and townspeople with woodland investments—are unacquainted with forest operations and particularly dislike the chore of selling logs or wood except on the stump. Such people frequently grasp

at chances to sell timber on "lump sum" basis to sawmill operators or logging jobbers, without exercising proper control over cutting. Also they frequently fail to get as much return as the stumpage is worth. Cooperative marketing, where soundly organized, has helped such owners. State or federal assistance is offered in many states without the necessity of joining a "cooperative."

Highly significant in the overall lumber production picture are two outstanding developments: The establishment of permanent large producing units, in parts of the South and in the West; and the increase in number and efficiency of small sawmills, frequently associated with concentration yards and remanufacturing plants.

Presumably, when the present serious shortages shall have been overcome, there will be increasing buyer insistence upon quality. As to price, already economists point to an average lumber price index far out of line with steel and cement. Such a situation invites criticism of the industry, even though it is commonly alleged that during the war inept handling of price controls forced Army and Navy purchasing authorities to a general scrambling of grades, which now appears to defy correction by government order. The view will not be found expressed in this report that lumber or other wood products will long enjoy a market oblivious of grade or competing substitutes. Yet the prospect for continuing profitable production of wood appears brighter than ever before.

STATUS OF FOREST MANAGEMENT

Federal forestry, managing 40 percent of the nation's sawtimber stand, contributed in 1945 about 4.4 billion board feet of sawtimber to the nation's production, or about nine percent of the total commercial cut. And it should be pointed out that 476,916,000 board feet of this total volume was taken from Indian forests, which in reality are private lands, albeit administered by the federal government.

A special service of the General Land Office manages a large tract of revested grant lands in western Oregon. Annual cut stands at 482,000,000 board feet (1945), a figure slightly under the estimated sustained yield. Actually, it is considerably less than what these forests might produce under more intensive care. Cutting on other public domain amounted to 12,625,000 board feet of sawtimber. A few million board feet were removed from military and flood control reservations.

The Forest Service, harvesting timber from the national forests at an average annual rate of 46 board feet per acre of commercial forest drain, can scarcely claim high productivity from such stands. In the beginning, much federal timber was inaccessible, private timber was plentiful and more easily reached, so Uncle Sam was protector and conservator rather than exponent of intensive management. After 41 years, such withholding policies, long viewed with favor by highly competitive private industry, are not easily discarded. Yet the present country-wide wood shortage makes it imperative that additional national forest production be developed immediately, particularly in the primeval stands.

In all management categories, present federal cut is less than estimated sustained yield capacity. The national forests as now operated are deemed capable of producing 5.3 billion board feet of sawtimber a year. The 1945 cut was 3.4 billion. Oregon and California revested grant lands are rated at 607 million board feet annually. The 1945 cut was 482 million. No rating is available for public domain and other lands; however, it is well known that current harvest is but a fraction of possible yield, which may be guessed at 200 million board feet. The estimated allowable cut from Indian forests is reported at 487 million board feet a year; the actual cut amounted to 477 million. Against this aggregate total

of 6.59 billion board feet, there was an actual cut in 1945 of 4.37 billion.

State Forestry Has Many Opportunities

Although state, county and municipal forests contain four percent of all sawtimber, their 1945 contribution was less than one-half of one percent of national production. Some of these forests are being overcut, a few are under intensive management, yet the greater portion of such holdings, newly acquired and characterized by young stands, are simply waiting.

Aside from forest protection and regulation, which are discussed elsewhere, state forestry's chief contributions to national progress are in the encouragement of planting upon private and state lands and in furnishing technical assistance to small landowners in managing and harvesting their timber.

Of 740 technical foresters employed in 1945 to provide education, information and technical assistance for farmers and owners of other small forest properties, about half were under direct supervision of state foresters. At the same time, state foresters exercised more or less control over 156 project foresters employed under the Norris-Doxey Act and 74 Extension Service men. The results of such work among small forest owners are so striking as to suggest the desirability of increasing it manifold.

Less commonly attempted, yet highly useful, are services of liaison between wood producers and conversion plants, particularly small sawmills, to convince operators of such plants of the economic soundness of manufacturing logs selected for cutting according to forestry standards.

Industrial Forestry Has Forged Ahead

The forest industries have made notable progress in a decade toward understanding the commercial possibilities of careful cutting to extend operating life within the limits of liquidation enterprise, and of sustained yield as a basis for permanent production. Recent legislation which has opened wide possibilities of combining private and public forests for long time operations has been a powerful stimulus to such thinking, particularly in the West.

Twenty years ago no more than a score of companies engaged in either pulp-paper manufacture or lumber production actually planned for permanent operation through the practice of forestry. The combined acreage owned by all such concerns fell short of two million acres.

At present, probably one-tenth of all lands owned by forest industry units is being managed for continuous wood production, while nearly twice as much more is held by owners who maintain high standards of careful cutting. Thus, it is estimated that 28 million acres is in ownerships which observe fairly good cutting practices, while owners of 50 million acres (some of it already partially or wholly denuded) expect to cut out and get out.

Forest industry in general supports the regulatory legislation enacted in 15 states. Increasingly, industrial owners are reacting favorably to the facts about forestry as a business. Yet there is a very large *terra incognita* owned by many small investors not directly connected with forest industries. Nearly a million such owners hold more than 100 million acres in tracts of less than 5,000 each, mostly in tracts of 100 acres or less.

Many such owners regard their holdings as savings banks, to be left alone until needed and then drawn upon as expeditiously as possible. From the forester's viewpoint such management falls far short of producing best growth or maximum ultimate value realization.

Woodlands Often Are Savings Banks

Acreage and stand considered, farm woodlots have made a highly commendable contribution to national wood pro-

duction, now estimated by various agencies at one-third of the cut from 15 percent of the saw-timber volume. There is a correlation between farming and woodlot management; successful farmers usually own thrifty woods, while those who frequently need money keep their forests impoverished. Unfortunately, close cutting and widespread ignorance of forest management have left much of the country's farm woods with scanty growing stocks.

Like the investor group of small forest owners, farmers who own woodlands are rarely conversant with sound forestry principles. They require assistance in selection of trees to harvest; often they need help in finding markets. Because their timber crops mature at intervals of several years, the most satisfactory aid is that which can be supplied by commercially conducted central agencies, as needed.

On the record, far more usable wood has been produced under private forest management than under public. This is understandable, since most cutting during the past 150 years has been on private lands. However, the harvest has been largely the result of ruthless liquidation, the taking of whatever wood was saleable, leaving to nature the task of restocking. Of intensive forestry such as has been known in Europe for almost as long, there has been little until within the last two decades. Conditions now favor such forestry in many parts of the United States, and challenge public and private foresters alike to increase yields and quality through growth and fullest utilization.

POTENTIAL WOOD PRODUCTION

The national yearly yield of forest products can be greatly enlarged if good management is put to work in all our commercial woods. If this is not done we shall have progressively declining outputs and poorer products. Good management means obtaining all the wood possible by growth and using all that is usable of what grows. In densely populated European countries, all portions of trees, including smaller branches, can be utilized. In some parts of the United States, very close utilization is practicable; in others, only relatively high grade logs can be profitably marketed.

Traditionally, American forests have been harvested in two ways—by selection and by clear-cutting. Usually, selection has been of the type commonly called "high-grading"—taking the finest trees of most desirable species, a method which promotes growth among the groups of rejects, but leaves progressively poorer trees to grow. Clear-cutting removes everything at one operation, oblivious of the presence in the stand of immature and over-ripe individuals.

Both methods are objectionable to the silviculturist, for he recognizes the forest as a place where young trees compete for the wherewithal to grow and veterans occupy valuable room while dying. He classifies the trees in any stand, young or old, as (1) capable of further growth, (2) suitable for storage for some time without loss, and (3) subject to early decline or decay. Naturally, he seeks to obtain all possible growth among trees of valuable species and type. Equally compelling is his desire to harvest decadent trees as soon as they can be identified, since failure to do so means loss of wood which they have produced.

Cuttings on considerable areas, both private and public, now take such principles into account, pointing the way to highly productive forestry. But in most forests, public as well as private, technical skill is still subordinated to expediency. High-grading persists; preferred species—particularly the widely useful conifers—are permitted to lose out to the more aggressive and usually less desirable broadleaves. Clear-cutting often is practiced in pole stands for production of bulk wood, thus forestalling maximum growth and future yields of high grade poles, piling, sawlogs and "peelers." In the older stands where clear-cutting is

practiced, losses of decadent elements continue until the growing and nongrowing trees are finally removed together.

Nationwide Management the Objective

Knowing the present condition of forests in all parts of the United States, their present volumes and the rates at which they are growing, it is possible to estimate the yields of sawtimber, which might be taken under management that would (1) restore deteriorated growing stocks to full productivity, and (2) remove decadent elements from primeval and untended stands. Obviously, such cutting would deal lightly, albeit selectively with eastern woods while leaning more heavily upon the stagnated western stands. There should be no discrimination based upon ownership or the objective of holding commercial timber untouched against some hypothetical future day of need.

The day of need is here, and all forests suitable for commercial management should be put to work. The table following shows what might be produced from them:

| OWNERSHIP CLASS | HARVEST CUTTING | IMPROVEMENT and THINNING | NATIONAL YEARLY CUT |
|-----------------------|-----------------|----------------------------------|---------------------|
| | | <i>In Millions of Board Feet</i> | |
| Private Forests | 16,964 | 12,727 | 29,691 |
| Public Forests | 5,862 | 8,460 | 14,322 |
| Total Yield | 22,826 | 21,187 | 44,013 |

These volumes represent sawtimber only. From 81.6 million cubic feet (estimated by U. S. Forest Service) of growing trees smaller than sawtimber, might come through regular thinnings 10 to 20 million cords of pulpwood and similar round material each year. These two classes of production add up to about as much wood as America expects to use annually. Yet, within a decade of such management, sawtimber production would increase considerably through increased growth upon a constantly expanding forest acreage.

Cooperation of All Agencies the Means

It is clear, of course, that such management involves many local changes in operating methods and in utilization. Forest areas now untouched must be opened up with roads. Conversion facilities will be required in undeveloped regions. There must be planning for production of many shapes and sizes of wood from each operating unit. Users of round wood must accept even greater volumes of material in smaller sizes, from a much larger aggregate territory. And sawmill operators must use the larger material most profitable for them to manufacture.

Such a development will be facilitated by new and specially useful machines which reduce the costs of felling, sorting, barking and loading logs and cordwood near the point of cutting. Given adequate technical assistance for small woodland owners and small forest industry operators, much improvement will come of itself. However, the larger operators should lead the way in bringing about such integrated and intensive management. Federal foresters, managing national forests and other public lands; state foresters, and two to three hundred of the leading lumber and pulp producers, if they will work together toward such a definite objective, can revolutionize American forestry in a decade.

By reason of a shift from the overworked eastern stands, production would be evenly divided between East and West. Comparison of estimated yield under such management, with the regional origins of 1944 cut, shows this:

| REGION | TIMBER CUT 1944 (Sawtimber, Billions of Board Feet) | SUGGESTED YIELD |
|-------------------------|--------------------------------------------------------|-----------------|
| New England | 1.9 | 1.5 |
| Middle Atlantic | 2.2 | 1.5 |
| Central | 2.1 | 1.1 |
| Lake States | 1.9 | 1.3 |
| South Atlantic | 5.5 | 3.8 |
| Southeast | 10.7 | 6.7 |
| West Gulf | 6.4 | 5.2 |
| Great Plains | .1 | .1 |
| Total East | 30.8 | 21.2 |
| Northern Rocky Mountain | 1.7 | 2.7 |
| Southern Rocky Mountain | .4 | 1.1 |
| Pacific Northwest | 14.0 | 13.6 |
| California | 2.6 | 5.4 |
| Total West | 18.7 | 22.8 |
| U. S. Total | 49.5 | 44.0 |

Nothing has been said of relationships between softwoods and hardwoods. Actually, today, softwoods compose 68 percent of the total volume of growing wood, while hardwoods make up the balance. In sawtimber, the softwoods amount to 80 percent. Utilization over the past two decades shows softwood leading by a ratio of 60:40, suggesting that future managed forests should produce no unsaleable surplus of hardwoods. Presumably a more difficult problem will be that of overcoming customer preferences for certain species in both categories.

PROTECTION OF THE FOREST RESOURCE

It is common knowledge that our forefathers in America were careless with fire. So long as land was relatively cheap and forests covered considerable portions of it, few settlers worried about recurring seasonal burns. Yet eventually, certain people began to regard fires with disfavor, usually because their own property or activities were threatened or interfered with. Unfortunately for the nation's fire record, the numbers of people conscious of the damage caused by this enemy of the woods, and determined to keep it under control, have rarely been large or powerful enough to be fully effective.

While forest fires have been with us always, co-ordinated public efforts to suppress them date from the early years of this century. The Weeks Law of 1911, provided authority for federal aid to state and private agencies. Such cooperation was greatly expanded under the Clarke-McNary Act of 1924. In the last 10 years at least \$113,000,000 has been expended by the states and by private owners, including \$26,000,000 furnished by Uncle Sam. Nevertheless, 127 million acres of privately owned woodland still lie outside the scope of regular patrol. Of 30 million forest acres burned over in 1944, nine-tenths was in such zones.

Federal cooperation now amounts to \$8,300,000 each year and soon will reach a limit of \$9,000,000. Yet it is now estimated that the cost of protecting 428,590,000 acres of state and private lands (including many non-commercial areas) is \$31,249,000 each year. Protection, usually under direct control of state forestry agencies, varies in effectiveness from state to state, suffering chiefly from local apathy and from being spread too thin.

Fire Protection Must Be Locally Demanded

To succeed, protection must be tied to forest ownership or to a use interest akin to ownership. To create conditions favorable for timber growing, state agencies and forest owners must join forces to intensify prevention measures as well as suppression facilities. Forty years' experience shows that local interest is essential, and that protection is most effective when locally organized and operated. Even

nationwide publicity programs are relatively ineffectual unless synchronized with aggressive local action.

The so-called "Keep Green" campaigns in several states have accomplished notable results in reducing fire incidence, while actively carried on. But people's memories are short and must be jogged anew during each recurring fire season.

The U. S. Forest Service estimates annual losses from the several natural enemies of forests as follows:

| DESTRUCTIVE AGENTS | SAWTIMBER (In Board Feet) | POLE TIMBER (In Cords) |
|---------------------|------------------------------|---------------------------|
| Fire | 859,254,000 | 3,836,922 |
| Insects and Disease | 1,936,884,000 | 3,394,902 |
| Windthrow | 1,438,805,000 | 1,644,688 |
| Total | 4,234,943,000 | 8,876,512 |

Next to fire, and normally ahead of windthrow as enemies of the forest, are the often associated tree destroyers, disease and insects. Actually, in terms of commercially useful timber, these two groups of killers are more destructive than fire.

Among the more threatening disease epidemics recently reported are: blights affecting beech and yellow birch in the Northeast, the Dutch elm disease in the northern Atlantic seaboard area, and the long established white pine blister rust, which extends across the northern states, wherever there is white pine, and into sugar pine stands of California. Mature ponderosa pine stands in the southern Rockies are being decimated by limb rust.

There Are Many Epidemics Today

Hemlock loopers and tip moths are active in the Pacific Northwest. Western pine beetles are still doing considerable damage wherever ponderosa stands are unmanaged in California, Oregon and Washington—also in the southern Rockies. Mountain pine beetles are destructive in western lodgepole pine stands, and the spruce bark beetle in recent years has killed several billions of feet of sawtimber in Colorado. Southern pine beetles are always at work in the young pine stands of the South. The spruce budworm now threatens to return in force to the pulpwood stands of northern New England, while gypsy and browntail moths still call for yearly control operations in the Northeast. Birch borers also are busy there.

Indicated federal appropriations for the fiscal year ending June 30, 1947, are as follows:

For insect investigations by the Bureau of Entomology and Plant Quarantine, \$409,900; for research in forest diseases by the Bureau of Plant Industry, \$371,500; for white pine blister rust control \$6,000,000 (control work in national forests and other federal areas and cooperation on private and state lands under the Lea Act); for research in Dutch elm disease, and limited control, \$285,500; for gypsy and browntail moth control operations, \$404,800.

A few states have enacted laws for dealing with tree disease and insect epidemics; some provide large sums yearly for control. Altogether more money is raised locally for such campaigns than is provided by the Congress, but there is no uniform pattern either for control operations or for sharing costs. In general, it is easier to secure local support for control where populations are dense and where the threatened forests have high use values. Primeval stands suffer enormous damage about which little can be done unless and until they are opened up to intensive management.

Coordination of Effort Is Needed

Looking toward the future, it appears desirable to enlarge the scope of federal work in detection and in planning and instituting control. Senate Bill 1863 (Second Session 79th Congress) would broaden the existing pattern of

federal aid by authorizing the Secretary of Agriculture, directly or in cooperation with other federal agencies, states, organizations, or persons, to detect and appraise infestations, to determine measures required, and to plan, organize, direct and carry out such control operations as he may deem necessary, subject only to approval of landowners or administrators concerned. The Secretary may require other parties at interest to contribute toward costs of control, or he may waive such requirement. The bill would authorize federal appropriations to implement the measure.

While increased federal research and better organization of detection are needed, plus more funds and greater flexibility in their use for control, the best possible insurance against insect and disease losses is intensive management. When forests are closely managed, immature trees can be saved from attack, and those veterans which succumb can be salvaged.

Since so many of our most destructive pests have been introduced from other countries, it should be regarded as essential that overseas lookouts and entry port inspections and quarantines be sharpened and aimed at tree diseases and forest tree destroying insects, and carried on with greater vigor than ever before.

ECONOMIC FACTORS AFFECTING FOREST OWNERSHIP

Justification for federal and state ownership of forests is not difficult to find. Often the case can be made on watershed or recreational values without regard to commercial timber. However, in recent years tree growing has come to be regarded as sound business for all classes of ownership.

Remote areas, removed from possible entry or sale to private interests long in advance of actual demand, are now found to possess important commercial values. Logged over lands, recaptured by counties, states, or Uncle Sam as a result of owners' unwillingness to pay taxes upon what was regarded as unproductive property, are now in many cases producing saleable wood by growth. The real future problem may well be to retard the trend toward public ownership, or to direct it in such manner that private operators willing to practice forestry may find suitable forest lands to own and manage.

Long schooled in the tradition of cut-out-and-get-out, or liquidation type of timber operation, most owners have been slow to undertake the growing of timber. Many reasons have been advanced to justify lack of interest. Property taxes have long been paraded as an obstacle to permanent forest ownership. Actually, most states have enacted laws to alleviate or postpone taxes upon growing trees, and one (Washington) has a deferred tax applicable to mature timber. Yet, few owners take advantage of such preferential schemes simply because taxing authorities generally are keeping annual levies at tolerable levels under the old system. At present such taxes are a barrier to forest ownership only in rare instances.

Federal Taxes Are a Handicap

Definite drawbacks to maintaining sustained yield operations over several generations of owners or large stockholders are the federal estate and state inheritance tax laws, some of which are admittedly designed to break up accumulations of wealth. Taxes are heavy and conditions of payment difficult. Times of payment should be extended over long enough periods to permit accumulating the necessary funds without forcing liquidation.

For more than 15 years there has been agitation for lending institutions capable of extending credit at low cost to sustain long-time forest ownership and operation. As private capital moves into the forest investment field, the volume

of credit needed to support continuous ownership and management of the 345 million acres now in various classes of private holdings will exceed the sums currently available from private banking sources.

Present inflation of stumpage values plays a part in the present enthusiasm for speculation in woodlands. Self-sustaining forest industries, small and large, will require help when the current "boom" recedes, even though the recession is slight, to cushion them against hasty liquidation. Farm woodland owners are reasonably well served by the farm credit setup, as are naval stores operators, their business having been classified by the Congress as agriculture. But the non-farm owners of forests, large and small, are asking, increasingly, for credit facilities tailored to their needs. Insurance upon growing trees is also advocated as a concomitant of credits for sustained yield ownership and management.

Forestry Can Pay Its Way NOW

It is being demonstrated in efficiently run woods operations that silviculture can pay its way through increased current realization and by laying up higher future values. At the same time planting where needed, and the tending of young natural stands, are shown to be financially sound in regions where markets are well established. Such forestry is practiced by an increasing number of strong and far-sighted concerns. However, there is a much larger number of operators and non-operating forest owners who are easing into forestry by adopting rudimentary methods, in effect feeling their way. It is important that the facts about costs and prospective returns from forestry be made available to such beginners.

Of especial importance (and possible hazard) in the prospectus of long-time wood production, are the schemes for vast programs of public expenditure to rehabilitate forests throughout the United States. Such programs may have a proper place in public forestry, but they should not be used as levers for forcing vast areas of private land into public ownership, or for raising costs of forest regeneration and tending to the relatively high levels now characterizing woods and plant wages in various localities.

Half of all commercial forests and more than three-fourths of all private woodlands (U.S.A.) are in ownerships of less than 500 acres each. Besides 50,000 to 100,000 operators of small sawmills and wood conversion plants, these owners include more than three million farmers and nearly a million investors.

Successful farming knows no wage and hour restrictions. While the farmer employs help in the competitive market and abides by whatever terms he finds necessary, his own contribution to the farm enterprise is never-ceasing. Similarly, freewill offerings of thought and labor must be made in the farmer's woodlands—and to some degree in all these small tracts—if the necessary cultural work of rehabilitation is to be accomplished. Whether done by the owner in person or through cooperative or part-time sharing of available labor and technical skill, these tasks must be closely controlled as to costs, if forestry is to be firmly established.

WHO SHOULD OWN AMERICA'S FORESTS?

Since 1872, when President Harrison created the Yellowstone Park Timberland Reserve, federal policy has inclined increasingly toward retention of the forested public domain in public ownership. By 1907, the national forest system included 100 million acres of such lands, mostly in the western states. Other reservations had been made for national parks.

In 1911, the Weeks Law authorized purchase of lands for inclusion in national forests, and since that time the National

Forest Reservation Commission has added 18,208,324 acres, largely cutover timberlands. Several million acres more land have been acquired in trade for nearly five billion feet of Forest Service stumpage.

During the depression, approximately 13 million acres of submarginal farm land was bought by the Resettlement Administration. Much of this was suitable only for growing trees. Military and Naval reservations were greatly increased during the war and included forest as well as tillage and pasture.

By 1945, Uncle Sam held title to 170,292,000 of the 656,374,000 acres of woodland in the United States. More pertinent to this discussion, federal ownership embraced 82,205,000 acres of commercial forest, out of a total of 465,094,000 acres, and federal officers managed 6,591,000 acres of Indian forests for their actual owners.

Most of the states have acquired parks for public use, and many have established state forest systems. Of state forests suitable for commercial timber growing there are estimated to be 17,902,000 acres, including more than two million acres of remnants of forest lands granted to them long ago by the Congress. Counties in many forested states have acquired considerable acreages of cutover land, usually through tax delinquency and forfeiture. Altogether, counties, cities and towns own 9,218,000 acres of commercial forest. In New England there are 333 town forests; in the country as a whole more than 2,000 community woodlands, covering nearly 3,000,000 acres.

When federal Weeks Law purchases began, there had been forest devastation, followed by fire, floods and erosion, in widely distributed localities. So, in acquiring such cutover areas the government was engaging its funds and technical resources to cure certain ills caused by unbridled private enterprise and public carelessness. Long before most of the states were able to do so, it was tackling the job of rehabilitating some of the most critical deforested and fire-ravaged lands in eastern United States.

Uncle Sam Bought Distressed Lands Cheaply

The depression brought the results of land abuse into even sharper focus, and the federal government met this emergency with increased purchases in greatly enlarged acquisition areas. Broad social and economic objectives were declared, and because land and timber values were depressed, Uncle Sam obtained bargains in cutovers and not a little mature timber.

During this period, counties accumulated formidable acreages of tax forfeited cutovers, part of which became state forests. In general, however, state incomes were too meager to permit them to compete with the federal government in the purchase of lands. Uncle Sam, on the other hand, could buy new national forests with funds obtained by borrowing against the future.

Eventually the war emergency put a stop to federal spending for such a purpose. State revenues meanwhile mounted to unprecedented levels, so that state forestry agencies were able to undertake ambitious land purchase projects. As 1946 came in, both federal and state agencies were looking forward to acquiring forest lands at increased tempo.

People hold various opinions regarding the desirability of increasing public forest ownership. At one extreme are those who would have government take over all forest resources; at the other are men who believe that all commercial timberland should remain in private hands. Many supporters of private enterprise, however, agree that there is little danger in state acquisition because financial limitations and easily aroused public opinion will prevent monopoly. Preference for state acquisition over federal rests

also on the assumption that states and counties can and will return substantial acreages of forest to private ownership when buyers will undertake to manage such lands satisfactorily.

Private ownership, because of its past liquidation policy, provides strong arguments for its enemies, while the recent notable achievements of private forest management are little known. Public ownership of forests promises continuous yields of wood, yet its production record is less than impressive, and indications are that public management will usually remain at levels below what may be expected from the more efficient private owners.

The fact that federal lands are not easily returned to private or even state ownership is a reason for opposing unrestricted federal acquisition. While in the past, private ownership has been slow to accept responsibility for stewardship of forests, or to recognize forestry as a sound business, the tide has now turned. Therefore, it is held that unlimited additions to federal ownership are no longer desirable.

Private Ownership Very Much Alive

After 75 years of being under attack, private forest ownership is still very much alive. Commercial forest acreages now privately held amount to nearly 350 million acres. If federal foresters are successful in their plan to add 35 million acres to national foresters, if state foresters' hopes are realized to the extent of acquiring four million acres of state forests, and if forfeiture of forested lands through tax delinquency amounts to a million acres in five years, private ownership in 1951 will still possess 310 million acres of the most productive commercial forest lands, or about two-thirds of the producing area.

Public forest acquisition may perform a useful function in support of private forestry, through absorption of critical lands whose earning power is low, as, for example, high watershed areas and semi-desert woodlands. Public ownership can deal adequately with recreation needs. Not the least service to be rendered by public forestry is demonstration of conservative management methods.

Every reasonable effort should be made to hold open the doors to private forestry enterprise; ownership of recaptured forest lands should remain fluid, where conditions are favorable for eventual movement into private hands; public ownership, whether state or federal, should be of a custodial nature, subject to later relinquishment. Permanent incorporations in public forests should be determined only after thorough study by appropriate state, federal and private interests.

PUBLIC AIDS FOR PRIVATE FORESTRY

Recognizing the paramount importance of forestry to industrial operators, the Forest Service maintains a division which works with state foresters and also directly with lumber, pulp and other wood processors, to acquaint them with the economic aspects of forestry. Under certain circumstances, it also assists owners in planning for improved management.

Section 5 of the Clarke-McNary Act of 1924, directs the Secretary of Agriculture to cooperate with state agencies to assist farm owners in establishing, improving and renewing woodlots, shelterbelts, windbreaks and other valuable forest growth, and in growing and renewing other useful timber crops. Under this provision, cooperative forest nurseries are maintained in most of the states, and from them farmers obtain planting stock.

Under the Norris-Doxey Act of 1937, the U. S. Forest Service, cooperating either with land grant colleges or state forestry departments, advises farmers regarding the estab-

lishment, protection and management of farm forests and in the harvesting and marketing of the products from such forests. These projects are in the field of "action" programs and as such are highly esteemed by state foresters. Technical foresters to the number of 156 were so employed in 1945.

Cooperative marketing of forest products is being tried both with and without direct federal aid. Sixty-nine such enterprises were in operation during 1945; twenty-one of them organized specifically for handling forest products. This method of aiding small woodland owners has advantages and serious problems, yet probably is here to stay. On the whole, best results are believed to be obtained through establishment of forest branches of existing agricultural cooperatives, of which there are 10,000 in the U. S. A.

Forest Extension Is Long Established

The Clarke-McNary Act, building upon foundations laid by the Smith-Lever Act of 1911, operated to give leadership in forestry education—as applied to small landowners—to the Agricultural Extension Services of the various states. It lodged responsibility with an extension forester, and required him to work through county agents to reach farm woodland owners. Between 1923, when seven states had such extension foresters, and 1945, the number had grown to 74. Their work consists of instructing county agents and specialists, preparing and distributing publications, and in giving field demonstrations of forestry practices.

The attitude of state foresters toward these federal aids is expressed by the president of their national organization as favoring "A service program for small timberland ownership; sponsored by state forestry organizations, financed jointly by federal and state governments, with the Extension Service confined to education and demonstrations."

Education and action programs sometimes overlap, so that duplication of effort exists. However, the results of such work indicate the desirability of multiplying present facilities at least five times so that educational and technical field services will be available in all the 2,600 counties where forests are important.

Recently, the Congressional appropriation committees and the Bureau of the Budget have undertaken to create some semblance of fiscal order by combining all appropriations for "Farm and other private forestry cooperation," including \$108,173 for the Extension Service. For the current fiscal year, this amounts to \$771,500. This includes nothing, however, that is clearly directed toward improvement of the small forest holdings owned by others than farmers.

Soil Improvement Programs Can Help

Among the important federal programs designed to improve farming methods and farm land, two have application to farm woodlands. The Soil Conservation Service, working in the soil conservation districts organized under state laws, is indirectly assisting in enlarging forest areas, through tree planting upon eroding slopes and other critical non-tillable areas. Forestry technicians also are promoting in a limited way local interest in proper forest management as a means of keeping suitable lands wooded, upon the farms.

The Agricultural Conservation Program (successor to A.A.A.) recognizes certain forestry operations as soil conserving and building practices. Although approved practices vary from state to state, benefit payments are being made for tree planting and for improvement cuttings. The possibilities of aiding farm—and other small ownership—forests through this program are immense, and at present very little developed.

Such practices as (1) fencing forest areas to control livestock, (2) planting idle land, (3) conversion of poor hardwoods to conifer stands, or even to better hardwoods, (4)

pruning plantations to improve timber quality, and (5) protection from fire, insects, disease and livestock, should be included in a really comprehensive program. With \$314,000,000 to spend in fiscal 1947 for its field program, this agency should be able greatly to increase tree planting on farms and forest management on small holdings, without seeking additional funds from the Congress.

1947 Research Funds Biggest Ever

The Agriculture Supply bill for fiscal year ending June 30, 1947, carries \$1,395,000 for research in forest products and \$2,380,000 for research in forest problems. Two appropriations for combined research and control work on forest diseases and insect infestations call for \$515,000 additional. This represents a high point in research appropriations allocated to the U. S. Forest Service, for the benefit of forest industries and forestry science.

Within recent years a number of states have launched research in forest utilization or management or both. Among them are Washington, Oregon, Texas, Ohio, Indiana (Purdue University), West Virginia and others. Lumber trade associations have set up several very fine research organizations, those of Western Pine Association and Timber Engineering Company (National Lumber Manufacturers Association) being outstanding. Several pulp-paper and lumber concerns conduct research in well-equipped and staffed laboratories.

With regard to forest research, three facts are fundamental: First, owing to more than 150 years experience with forest management in Europe, and a fair number of successful forestry enterprises in this country, more is already known about forestry than can be put into effect in the next 50 years. Second, it is doubtful whether as many as 1,000 out of 6,000 practicing foresters in the United States actually work in the woods where they control cutting methods and directly contribute to increasing production. Third, it will be difficult to muster enough technical personnel for an adequate program of forest owner education and technical assistance.

More Foresters Are Needed in the Woods

It is important to place as many newly trained technical personnel as possible directly in woods work rather than in swivel chairs. This requires that fields of technical work more concerned with office compilations than woods operations should not be unduly expanded at the expense of getting technical men in creative control of cutting operations. The manifold problems of utilizing a greatly increased percentage of inferior species and small trees, from forests subjected to light and frequent cuttings of both mature and surplus elements, are very intricate and important.

Important research achievements have occurred in some fields of forest products. Most notable and complete in application is the work on kiln drying and on strength, workability, resistance to decay, methods of use, and other characteristics of structural and other woods. This includes use of wood in boxes. Notable work has been done on pulping and reaction of various species to different processes. Work in wood preservation is well abreast of current needs.

Research fields little covered include chemical conversion of wood and of constituents of wood such as lignin. Thorough investigations should be completed covering conversion of wood or its constituents to sugar, ethyl alcohol and related products. Destructive distillation should be thoroughly re-examined. Work on lignin chemistry should be well supported. The by-products of the sawmilling and other wood-working industries and of the pulp and paper industry are enormous in quantity and should, in time, provide the foundation for large industries.

Wood Must Be More Closely Utilized

Necessary cutting of inferior material in processes of forest management is a potential source of enormous additional quantities. If processes of conversion of wood waste to ethyl alcohol had been in general use during the war, large quantities of grain could have been saved for stock feeding and human use.

Special mention should be made of the need for research on use of wood fuel. This is the second largest use of wood in the country. It is characterized by antiquated burning equipment and laborious hand methods of preparation. Failure to integrate preparation of wood fuel with extraction of sawlogs and rough lumber manufacture results annually in use of nearly four billion feet of sawlogs for fuel. Concurrently woods and mill refuse is wasted in quantities far in excess of fuelwood needs. This situation should be corrected by research and application of the results.

To a considerable extent, accomplishments have been limited in the forest products field by scattered efforts. Particularly in state work it seems desirable to concentrate on completion of a few projects rather than wander over too many fields superficially. Private enterprise should participate in products research more extensively than in the past. Aggregate private effort has, however, been very substantial in the pulp and paper and some other large unit industries.

There is a strong tendency for research to become a business conducted with little regard for actual needs, but with an eye to promoting whatever projects have appropriation appeal. From time to time there should be a thorough independent professional survey to bring activities back to sound requirements.

THE PUBLIC STAKE IN MULTIPLE USE

It is generally assumed that most federally-owned forests are administered for multiple use. The principal uses are: wood production, water supply, grazing, recreation and production of fish and wildlife. While production of wood may be regarded as the most important use upon a major portion of the nation's forests, the fact is that certain very large areas possess watershed and other values which may take precedence over commercial wood production.

In parts of the West, forested watersheds provide the lifeblood of agriculture and other human pursuits. It is frequently true that the management of other lands intermingled with forests becomes of tremendous importance to the beneficiaries of these water supplies. Thus it is to be noted that the action of the 79th Congress in cutting the funds for operating the Grazing Service down to an inoperative basis offers a serious threat to future water supplies in the entire Southwest. It also threatens to undo the rehabilitation of grazing resources accomplished in the years since passage of the Taylor Grazing Act.

The conclusions reached in the field by members of the Forest Resource Appraisal staff add up to a general conclusion that forest management which provides reasonably careful logging, accompanied or promptly followed by restocking, and including protection from fire, insects and disease, works no appreciable reduction of watershed values but tends rather to increase them by converting stagnant forests to thrifty stands. Properly controlled grazing of cattle and sheep is likewise harmless. Management on most public lands, prior to the recent Taylor Grazing Act debacle, has aimed at such standards, but private lands have suffered from close cutting, fire and over-grazing.

Relationships Are Being Studied

Maintenance of streamflow in eastern industrial states is important. Relationships between management of water-

shed forests for wood production and streamflow are being studied by various forest experiment stations. The question of what should be done to assure best supplies and fullest use of water frequently is complicated by ownership. As a rule public ownership appears desirable in critical areas of low commercial value.

Recreational values often have served as foundation stones under state forestry. It may happen that press of popular demand for recreational use will outweigh commercial considerations. Game cover may demand larger open areas than silviculture desires: when that happens the higher human use will take priority.

In several eastern and southern states the administration of fish and game laws is much bigger business than state forestry. While such a situation may irk the forester it reflects public interest. And it may be argued that any state activity which directs attention to the forest and to the need of giving woodlands care and protection is favorable to forestry, and in the long run will tend to help its development.

Similarly, recreation attracts public attention to a far greater degree than does forestry in many states. Since no licenses are required for simple enjoyment of the outdoors, recreationists are less easily counted. And of course it is well nigh impossible to make them pay for maintaining the sources of their enjoyment, except over the tax rolls. This, too, is advantageous for the state forester, providing him with allies in his struggle for state appropriations with which to protect the forests.

Intensive Forestry Provides for Many Uses

There need be no quarrel between forest management for commercial wood production on the one side and recreation, hunting or fishing on the other. Forests aid in maintaining water suitable for fish culture and pleasant surroundings in which to take them. The managed forest should always maintain a third of its area as fresh cutovers and young stands, and a second third as pole stands, so there should continue to be room for game in our woodlands. And so long as recreationists behave themselves in managed forests they will find pleasure and a welcome.

There is a community of interest between the forester who manages woodlands for commercial wood production and the beneficiaries of other forest use. His prime considerations are that the forest be kept free from fire and that his operations be unhampered. Enjoying security in these matters he gladly provides water, forage, recreation and sport as well as wood. Some day he may even be able to increase his forest income by charging for all these products instead of but two.

FORESTRY BY COMPULSION

Forest regulation is an issue much discussed during the past two decades, particularly with reference to the problem of securing application, upon privately-owned forest lands, of harvesting practices calculated to maintain satisfactory growing stocks. In its broader aspect, regulation deals with such collateral problems as protection of forests from fire, insects and tree diseases. Since it affects the actions of individuals and private corporations, there is involved the question of jurisdiction as between state and federal authority.

In the matter of protecting forests from fire, most of the states have enacted laws limiting freedom of private action. While statutes vary widely in scope and severity among the states, authority to regulate has been clearly demonstrated. While state constitutions may have presented obstacles to fully adequate action, in a few cases, there appears to be little

justification for federal intervention with respect to fire protection.

In the war upon insects and tree diseases, the federal government has furnished reconnaissance and research in control methods. Federal aid has been provided for certain large-scale control programs and federally imposed embargos and quarantines are common practices. Certain states have appropriated considerable sums for control, or have improved their own quarantines, or both. A few have enacted laws providing for action programs with compulsory support by landowners in situations of extreme need. In general, it may be stated that serious conflicts of authority are not obstacles in the way of solving insect and disease problems.

The Public Desires Devastation Stopped

Since colonial days, there have been efforts by government to control timber harvesting—and resistance to such controls. Many sincere conservationists, including a considerable number of federal employees, have urged regulation of private timber harvesting. There is implied in their attitude a belief that federal foresters, if given authority, can and will put an end to destructive logging, and that an important step will have been taken toward nationwide forest rehabilitation.

Customarily, the man in the street assumes that public forests are well managed. As a result of his own limited observation and the impact of propaganda from many sources, this mythical average citizen believes that state stewardship of publicly owned forests is good, that federal management may be even better, and that private treatment of privately owned woodlands has been scandalous in the past but is now much improved. Like other citizens, he may strongly support the regulation principle or oppose it, according to his lights.

Actually, of course, the development of technically sound forest management on the public lands has been a slow process, impeded by public lethargy and private opposition without, and by lack of facilities within the state and federal governments. The pattern presented today is varied as to objectives and uneven in performance.

Fifteen States Have Harvesting Laws

At the end of 1945, 15 states (California, Idaho, Indiana, Louisiana, Maryland, Massachusetts, Minnesota, Mississippi, Nevada, New Hampshire, New Mexico, New York, Oregon, Virginia, Washington) had enacted laws intended to promote regeneration of forests after harvesting, by various means. These statutes range from mandatory and strong to voluntary or advisory. Most of them have been in effect too short a time to permit of judging their usefulness.

It is proposed by the U. S. Forest Service that there be enacted by the Congress a law authorizing the Secretary of Agriculture to cooperate with the states in setting up satisfactory forest practice regulation, within a specified period, and to impose such regulation by federal authority where state action satisfactory to the Secretary is not taken. The intention is to encourage state action but to secure the regulation, one way or another, within the near future. Although the Forest Service has not indicated formally what would be the cost of administering such a law, common sense teaches that it would build up rapidly to several millions of dollars each year.

Proponents of forest regulation—and they are many—agree that some action appears desirable. There is disagreement regarding the method and probable results. The conclusions reached by members of the Forest Resource Appraisal staff after examination of forest conditions in many states and observation of the results of laws now in force, may be summarized as follows:

As the Forest Resource Appraisal Sees Regulation

1. Public opinion is nowhere strongly in support of imposition of federal controls over private forest management. Certain groups, in certain localities, are advocating such controls, usually as a result of intensive propaganda by federal officers, chiefly members of the U. S. Forest Service.

2. Public opinion in some states supports the idea of state regulation of forest harvesting, but such thought usually is tempered by a traditional dislike of interference with private enterprise. Since support is necessary if laws are to be enforced, after enactment, it is clear that state forestry agencies must exercise skill in making such laws work and must publicize their beneficial effects. The point is made that good legislation intelligently administered tends to improve its own environment.

3. The present setup of federal agencies in managing public lands does not make for confidence in their ability to take over the task of regulating forest harvesting throughout the country. Among the unfavorable features to be noted are: inexperience of personnel; preoccupation with ideologies; centralization of authority; wasteful spending; jurisdictional struggles; and failure fully to utilize productivity of forests under public management.

4. Forest practice rules calculated to stop careless and wasteful harvesting on *all* private forest lands are everywhere desirable. They should be regarded as essentially *stop-loss* measures, necessary for controlling the reactionary or recalcitrant element in each state. Licensing of all commercial logging and other timber-cutting operations under proper restrictions commends itself as a practical method of forwarding these objectives.

5. The requirements of permanent forestry go far beyond the scope of enforceable forest practice laws. To be successful, legislation must begin with simple provisions, broadly applicable. Such laws can deal superficially with stands as they exist at the time of cutting; they cannot take the place of continuing skilled management.

6. A weakness of all legislation so far framed for the purpose of regulating the harvesting of forests, stems from the acknowledgement by lawmakers of the landowner's right to clear trees away at any time in order to put the soil to some other use. The use of land as its owner desires is a traditional right in America, yet it is no more unassailable than many other rights which have been curtailed for the public good.

ACTION AND EDUCATION

There has been a widespread tendency to discredit the practices of Americans engaged in the forest industries, excepting only the few who were able to operate in federally administered timber. Private forest industry has labored under a double moral handicap; it has been identified with and indiscriminately accused of timber grabbing by culpable methods; and it stands convicted of a perverse indifference toward the practice of forestry.

Rather than persist in declaring the present timber supply situation a fruit of willful industry evil-doing, it is sensible, and far more accurate, to acknowledge that the American people, wood users as well as forest owners and wood producers, have expended through the years only such efforts as have been necessary to meet their collective wood requirements. Actually, for better or worse, during the past one and a half centuries, they have produced nearly half of the world lumber output.

A dozen years ago, the timber supply shoe really began to pinch—this might have happened earlier had not the depression intervened. A few of the more alert forest owners became convinced that forestry was economically sound and began to apply forestry principles in their holdings. Their

number has increased amazingly since, yet there still are many who do not practice even the most rudimentary forestry.

More than three million farmers own woodlots, yet less than one in ten knows how to give his woods the skillful care he gives his field crops. Another million non-farmer owners of woodlands, mostly small, appear to be even less equipped than the farmers to tend their forests well or harvest and market their trees advantageously. These people are very important, having it within their power, by sheer force of numbers, acreage and wood volume, to add tremendously to the sustained yield of our forestry establishment.

Forestry Must Be Positive

Forestry having come of age, financially, and the country needing wood in all sizes and shapes, today's urgent task is to get intensive management into the woods. This cannot be accomplished simply by enacting laws requiring that it be done, for regulation is essentially negative—composed of "shall nots"—while forestry is a complex of principles applied with skill over a term of years. An obvious alternative is to convince forest owners and operators that their own best interests will be served by doing certain things which are good for the forest—and then help them to do these proper things.

One problem, then, is to devise ways to reach these various classes of owners with convincing facts about forestry in terms of their own properties—and to do so at the earliest possible moment. Second, the services of technically trained men—private consultants or public employees—must be available at reasonable cost and under trustworthy sponsorship—such as state foresters or extension services—to show them how to put the facts to work. Certainly, too, federal agencies engaged in helping improve farms and farming should increase their activities in support of tree growing as a commercial adjunct of the farm enterprise. This is particularly urgent in the South.

Public land administrative agencies—and their conservation minded supporters—deserve the nation's thanks for stemming the tide of land disposal and resource despoilment, and for holding their lines against further depredations. It is well, however, also to remind them that now is the time for public forest administration to become positive. It is

not enough simply to conserve timber; they must use what has been grown and grow more, wherever there are commercial forests in their care. By doing this they will demonstrate the soundness of the advice that for so long has been freely sent out by our government to other forest owners and managers.

The Public Needs Information

It may be said that Americans have done shockingly little about preventing fires and other natural enemies from destroying their forests, always delaying action until the damage has been done. Catastrophic burns and devastating epidemics, of which there have been and are literally hundreds, frequently result in local efforts to improve protection. But there appears as yet to be no strong national consciousness of a need to unite for the country's defense. While local action is certainly essential, something else is needed.

Here is a fertile field for public information and guidance. Awakening ordinary citizens to the meaning of forests in their daily lives should serve to create favorable environments for better forestry laws and more effective administration. Such agencies as the U. S. Forest Service and various state conservation departments are engaged already in such work. Certain private groups are also beginning public education campaigns. There should be many more, working along related lines and with plans and support for going forward so long as any substantial part of the American public remains uninformed or indifferent.

By and large, this looks like a selling job. Forest land-owners must be sold the desire to improve their earnings by practicing forestry. Technical services must be sold to whomever can use them, when needed. Forest industries must be convinced of the wisdom of using forms of wood best adapted to their various needs. The public must be acquainted with the economic and social values of forests and sold on the proposition that they are worth protecting and using properly. Public foresters should be encouraged to lead the way by aggressive management of the resources in their care. The job can be done. Americans must get busy, on the tremendous scale demanded by the numbers of people to be dealt with and the urgency of the present situation.

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How Much Big Game?

A TOTAL of 2,326,000 big game animals now make their homes in the national forests of the country, according to a census recently announced by the U. S. Forest Service. This is an increase of 27,500 animals over 1944 estimates. All of the 38 states in which there are national forests reported big game, with the exception of Kentucky.

By far the most widespread clan in the big game family is that of the deer. Its number totaled 1,995,000 in 37 states. The 557,000 whitetail deer reported are in national forests of 33 states from coast to coast. While greater in number, the mule deer, totaling 1,147,000, are found only in the forests of 12 western states and Alaska. Black deer, totaling 291,000, occur only in the forests along the Pacific Coast, Alaska included.

Of the 160,000 elk recorded, all are found in the forests of the western states except for 150 counted in Arkansas and 10 in North Carolina. Bear records show 88,300 in the national forests—6,300 grizzlies and Alaska brown, the rest black bear. The grizzlies occur in the forests of Colorado, Idaho, Montana, Washington and Wyoming, while the black bear is found from coast to coast.

There are 30,000 antelope, 20,000 mountain goats, 9,900 bighorn sheep and 9,600 moose in the western national forests.

The peccary or native American wild pig, roams in the forests of the Southwest, 11,000 being found in Arizona and 1,000 in New Mexico. Wild boar occur in widely separated areas—200 in California and 1,180 in North Carolina and Tennessee.

Rarest of big game animals on the national forests is the caribou. Only 15 were reported in Washington, 10 in Idaho and four in Montana.

Not more than twenty thousand mountain goats remain in the national forests of the West



From coast to coast the federal forests support more than eighty thousand black bear

KNOWING YOUR TREES

GRAY BIRCH

Betula populifolia Marsh.

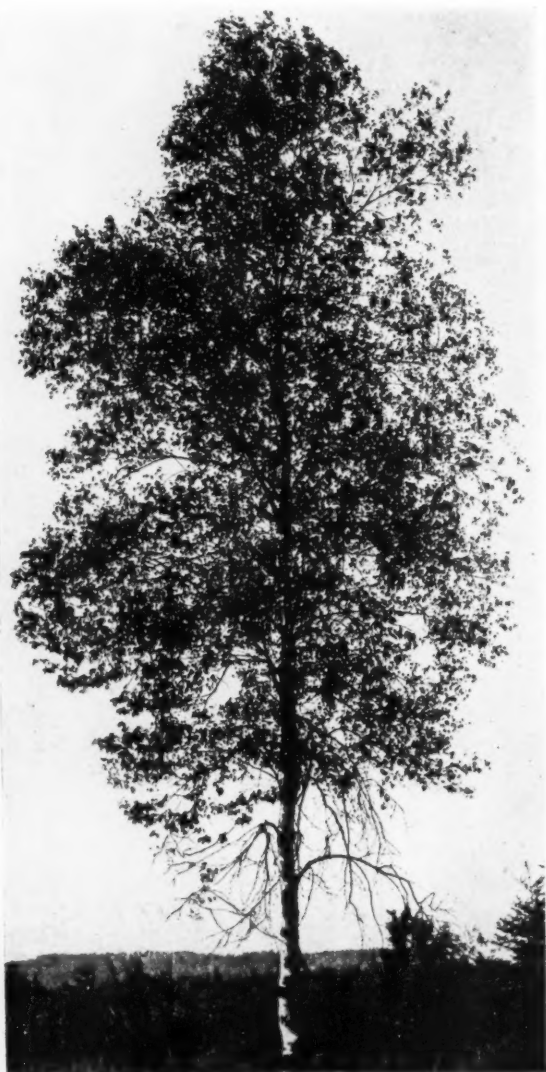
By WARREN D. BRUSH

THIS is the smallest of our northeastern tree birches. Although it resembles rather closely the paper birch in form of tree, leaf and bark, there are distinct differences which can be easily recognized. Gray birch grows over much of the region where paper birch is found but is much more restricted in its distribution which is from Nova Scotia, Cape Breton Island, New Brunswick and the lower St. Lawrence River southward through New England, eastern New York, eastern Pennsylvania and New Jersey to eastern West Virginia and Delaware.

It is commonly found on moist soil along streams,

ponds and lakes; sometimes also in swamps and along their borders. It is also frequently seen on dry, sandy or gravelly soil. Because, like paper birch and aspen, gray birch springs up quickly on impoverished soil, it grows on large areas of burned-over and abandoned land and performs a real service in covering the ground and affording an opportunity for the growth of other more valuable species.

The tree commonly attains a height of only 20 to 30 feet and a diameter of 15 inches or less; it is seldom more than 40 feet high and 18 inches in diameter. The



Short slender branches and delicate foliage clothe the Gray Birch nearly to the ground, giving it a narrow crown



After the leaves have fallen, the graceful, often pendulous, and more or less contorted branches come into prominence

short, slender, often pendulous and more or less contorted branches clothe the stem nearly to the ground and form a narrow, pyramidal, open, pointed crown.

The alternate leaves which occur singly or in pairs on the bright reddish brown or grayish twigs, are thin and firm, dark green above and paler beneath, turning pale yellow in the autumn. They are nearly triangular in outline and bear a resemblance to those of eastern cottonwood (*Populus deltoides*), hence the specific name *populifolia*, which is sometimes translated into the common name "poplar-leaved birch." However, in gray birch the leaves are long pointed and the margins are double-toothed. Measuring two to three inches long and one and a half to two and a half inches wide, they have long slender stems and, like the quaking aspen, they flutter in the slightest breeze.

In April or May as the leaves unfold, the male flowers appear in slender, yellowish catkins which, as in all the birches, were formed during the previous growing season. During the winter they are one and a quarter to one and a half inches long and in the spring increase to from two to four inches. They hang from the twigs singly or occasionally in pairs. The greenish female catkins, one-half to one inch in length, stand nearly erect on stems one-half inch long. In the fall they develop into small, cylindrical, erect or drooping, slender-stalked cones with deciduous scales and many small, nut-like, winged seeds. The wings, slightly broader than the seeds enable them to be carried far by the wind. This accounts for the tree quickly taking possession of burned-over, cut-over and abandoned land, which has given it the name "oldfield birch." Abundant seed crops are produced nearly every year and the seed germinates readily. The tree also reproduces by sprouts from the stump when it is cut.

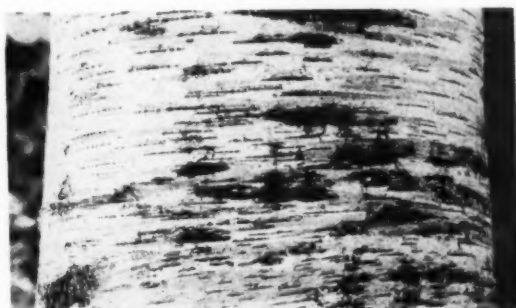
On young trunks and branches the bark is reddish brown or grayish, soon becoming grayish white with a reddish yellow inner surface, and on older trunks darker and rough, and irregularly broken by shallow fissures. While resembling that of paper birch, the bark of gray birch is darker, rougher, peels much less, and has rough, black, triangular patches below the branches or where a branch has been.

The heartwood is light brown and the thick sapwood nearly white. A cubic foot of the air-dry wood weighs about 35 pounds. It is close-grained, soft, not strong and has low resistance to decay. Like paper birch it is easily worked with tools and because of its fine, soft, even texture it is an excellent wood for turning. While the uses are similar to those for paper birch, including small woodenware such as spools, clothes-pins, and turned novelties, gray birch is of much less value for these products because of the small size of the tree and the consequent waste in manufacture. It is well-liked for fuel, and stands can be cut over for firewood at comparatively frequent intervals because of its ability to renew itself.

A short-lived tree, it grows rapidly and is free from disease and insect injury, although it is often seriously injured by ice and snow. The pleasing form, nearly-white bark, graceful, slender branches and delicate foliage combine to make gray birch an attractive tree for ornamental purposes but its desirability is lessened by its short life and liability to injury by storms.



The cylindrical cones are packed with small, nut-like, winged seeds which are carried by the wind



On young trees the bark is reddish brown or grayish—on older trees it is darker, rough and irregularly broken



Growing singly or in pairs, the thin leaves are triangular in outline, with double-toothed edges



Range of the Gray Birch which is common on moist sites

A Family Discovers Forestry

(From page 407)

for division of the 100-acre property into 10 working areas of approximately 10 acres each. One area will be worked over each year, removing only the mature and inferior trees. This will provide a healthful spare-time job for the family—a job which will not yield a fortune each year but one which will more than pay its costs. And the value of the property and of the remaining timber will steadily increase.

During the war, 10 prisoners of war were employed in the forest for a two-month period to produce pulpwood. The Hoffmans still point to the cleancut stumps, level to the ground, left by a pair of Austrian woodsmen. At that time Ivy Hill echoed with the yodeling of the Austrians, who with pieces of crowsfoot in their hats would set out with their axes and saws for a day's work as though they were still in their native Alps.

Now that Ivy Hill is on a peacetime basis, the forest employs a crew of

about six men during the summer—high school and college boys, a war veteran or two. One worker, a young Boy Scout, has earned his forestry merit badge and is gaining practical forestry experience at Ivy Hill. He recently earned an advancement in the Hoffmans' job classification from "axman and sawyer" to "junior woodsman," which carries with it an additional 10 cents an hour.

The Hoffmans are proud of their high school boys, although from 50 to 75 percent of them "can't take it" and quit before the season is over, usually before the water is out of their blisters. Of the boys who stuck with it last year, one football player advanced from the second to the first team, another was chosen for the "All Maryland" team, a third made the "All Star" lacrosse team. After several weeks' work the boys could handle an ax quite well.

In the woods operations, tree-length logs are brought to several landings along the woods roads.

Here they are sorted. Sawlogs are taken to a local sawmill for production into boards which the Hoffmans sell, rough and green. Logs and pieces which will not yield lumber are corded up for pulpwood, and the small sticks which will make neither lumber nor cordwood are ricked for fuel. Thus nothing salvageable is wasted. Markets are good and promise to remain so. Local builders in search of lumber have beaten a path to Ivy Hill; there is a ready market for all the pulpwood that Ivy Hill can deliver; and the City of Baltimore provides a ready market for fuelwood.

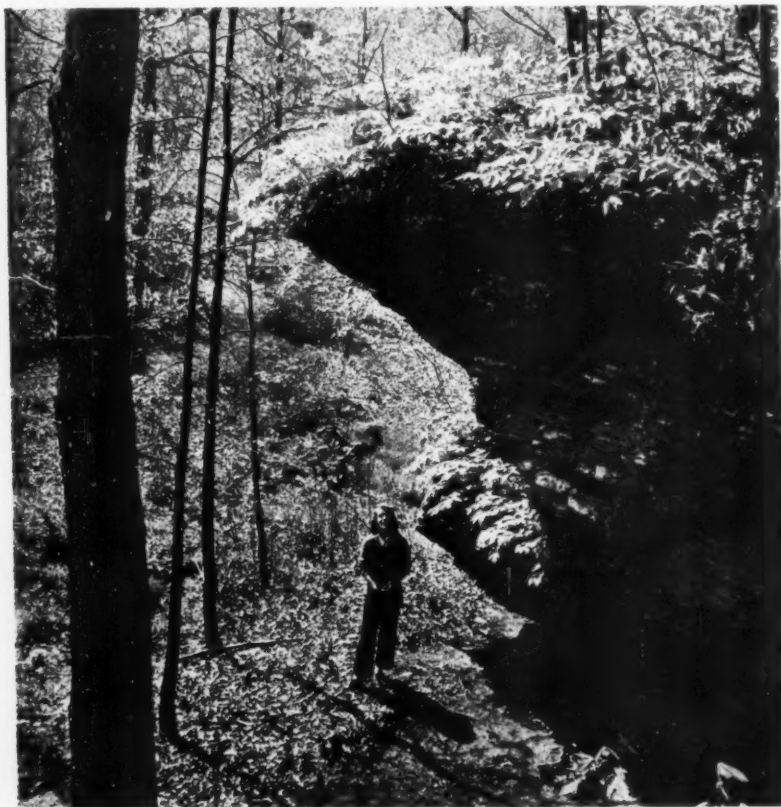
A typical Saturday morning will find H. Lee Hoffman at Ivy Hill with a boardfoot scale in hand tallying the lumber being loaded on the trucks of local buyers. This job out of the way, he hikes into the woods to check on the work of the crew, or stops to see how the girls are doing with the weeds in the transplant bed where they have hemlock, arborvitae, white pine, red pine, Austrian pine and Chinese and native chestnuts started for later spot-planting in the woods. Or he may check on his experimental cultivation of native azaleas and huckleberries.

The whole family pitches in. If you want to know the exact log tally or shipments or sales, you consult Mrs. Hoffman who, with little extra display of effort, serves as Ivy Hill's business manager in addition to managing the household, teaching at Friends School and composing music and lyrics. One of her pieces was the theme song for outdoor life shows which her husband organized in Baltimore in 1937 and 1938. Its line, "Conversation never saved a nation," expresses the family's belief that the basic trouble with the natural resource problem is "Too much conversation and not enough actual conservation." This is being corrected on a small scale at Ivy Hill.

Not one of Ivy Hill's 100 acres may be considered as idle. It is true that some of the acres are not producing to their full capacity, but the Hoffmans are correcting that condition by their methods of harvesting and of stand improvement.

As you inspect last year's landing where the activities of skidding and loading logs have scoured up the soil, you note a growth of buckwheat near the roadside and, as you move back towards the woods, a planting of les-

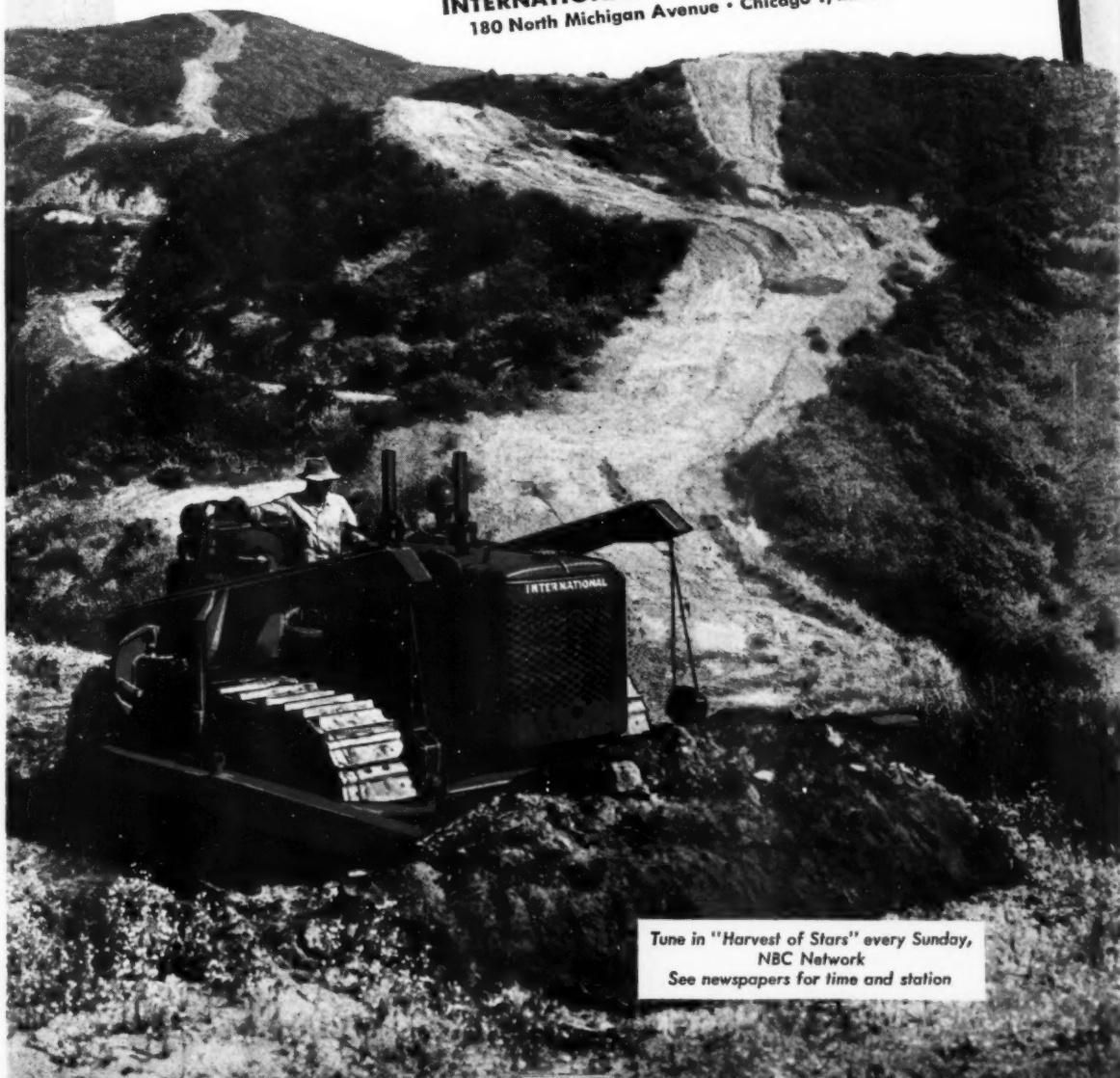
The ultimate objective at Ivy Hill, as with all conservation enterprises, is better living in a healthful and inspiring environment



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pedezia. These areas have been sown with cover and food plants to attract desirable species of game birds. There is no erosion problem at Ivy Hill. The method of logging retains good cover for the soil, and the woods roads are laid out with a view to the least disturbance of soil conditions. There are no sidehill road locations.

Two streams course through the area. One rises from a spring of good volume on Ivy Hill. Its waters are crystal clear even in the heaviest downpour. The other creek rises two or three miles away and passes through agricultural land bringing with it "enough of our neighbor's topsoil to start a truck farm of generous size."

On the one stream, the flow of which is only slightly retarded by an ancient and leaky dam, the Hoffmans plan a small recreational area. They will rebuild the dam, raising its level about three feet to provide a lake suitable for boating and swimming. Other plans for the development of Ivy Hill include the erection of a small sawmill and suitable housing for forest workers who now must drive or be hauled from Baltimore.

The interest of the Hoffman family in conservation first gained public notice in the late 1930's when H. Lee was president of the Maryland Outdoor Life Federation. Among other conservationists he sensed the weaknesses in the multiplicity and overlapping of state agencies having to do with conservation problems. At that time, Maryland had 10 agencies in the field of conservation of natural resources. Acting independently, two or more of these agencies might be concerned with different phases of the same problem. Coordination of policies was lacking.

Hoffman led a statewide educational program to make the people of Maryland keenly aware of the importance of their natural resources and of the inefficiencies in the multiple-bureau setup. Not being content to criticize without pointing the way to improvement, the campaigners steered public thinking around to a unification of natural resource responsibilities. The result was a public referendum in 1939 which gave the legislature the people's mandate for a coordinated state program of resource use and development.

As a result of action following this referendum, the Maryland Board of Natural Resources was established in 1941, and the conglomeration of agencies was reduced to five active departments: tidewater fisheries; game and inland fish; forests and parks; geology, mines and water resources; research and education. The Board of Natural Resources, made up of the heads of these departments and seven others appointed by the governor, serves to coordinate the departmental activities.

The study put in by Hoffman in spearheading the drive toward coordination in state conservation affairs is now being adapted to the management of a part of the state's natural resources. At Ivy Hill, one sees an example in integration of purposes—the growing and harvesting of woods products, erosion and stream control, wildlife conservation, recreation, employment, research and education—all pointing to the ultimate objective, better human living.



John C. Redington

DEATH CLAIMS JOHN C. REDINGTON

John Chase Redington, field secretary of The American Forestry Association's Forest Resource Appraisal from early 1943 through 1945, died suddenly at Franklin, New Hampshire, on July 25. He was 68 years old.

Since January 1, Mr. Redington had been associated with the New England Forestry Foundation, making his headquarters at Franklin.

During his three-year service with the Association, Mr. Redington devoted his great energy and enthusiasm to the financing of the Appraisal. His field of activity carried him into every section of the country and his spontaneous and genuine interest in forest conservation made many friends for the movement.

Born in Chicago in 1878, Mr. Redington graduated from Dartmouth College in 1900. His professional career, prior to his conservation work, was varied and included advertising, production management, paper research and lithography.

Long interested in military matters, beginning with membership in the First Corps of Cadets of Boston, he saw service during the Mexican border incident with the First Illinois Field Artillery, and in World War I, as a captain with the 149th Field Artillery, a part of the Rainbow Division, he participated in some of the most crucial engagements in which the American Expeditionary Force was involved. He was cited by General John J. Pershing for "distinguished and exceptional gallantry."

Prior to this country's entry into the last world conflict, Mr. Redington organized and developed the Wilton (Connecticut) Volunteer Training Corps to give young men pre-induction training. This project was used as a model for similar organizations.

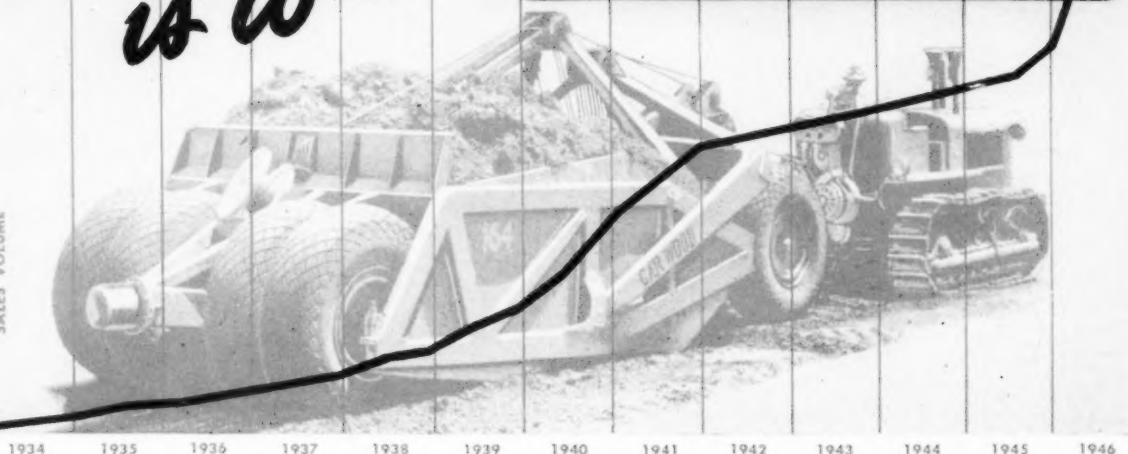
Mr. Redington was a twin brother of the late Paul G. Redington, former chief of the old Biological Survey and, prior to that, assistant chief of the U. S. Forest Service.

*The trend
is to -*

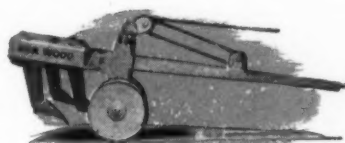
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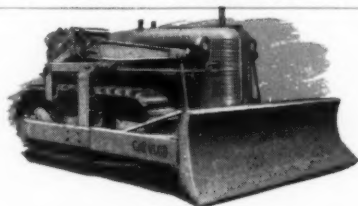
SALES VOLUME



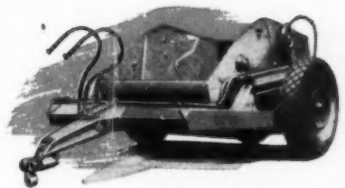
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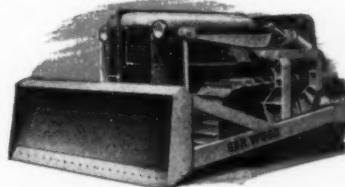
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CONSERVATION IN CONGRESS

By A. C. HALL

THE Congress which adjourned sine die on August 2 faced an active war period and a weighty mass of reconversion legislation during its 20 months in Washington. That conservation measures did not loom large in congressional action was to be expected. In fact, in viewing the conservation legislation actually enacted, the 79th Congress appears to have been a lean one. However, conservationists can see considerable progress and can envision a livelier and more promising future in the types and numbers of bills which were introduced. Doubtless many of these or their counterparts will reappear in the 80th Congress.

From the standpoint of budgets, all conservation agencies, except the Grazing Service, are off to a good start on postwar work. Not all appropriations requested by these agencies were approved, of course, but anyone reviewing the record can see that conservation in general did not suffer in favor of national budget balancing. The Fish and Wildlife Service, for example, has the largest appropriation in its history. The Forest Service, especially in its research programs, is well financed for the fiscal year; and the National Park Service received substantially increased appropriations with which to resume and expand activities curtailed during the war. Other agencies such as the Soil Conservation Service, the Indian Service and the Tennessee Valley Authority, likewise, have the funds necessary for their initial postwar programs.

The abolition of the Grazing Service and its consolidation within the new Land Management Agency of the Department of the Interior is a change about which many conservationists have difficulty forming an opinion. While admitting that federal land-use policies in regard to lands administered by the Grazing Service needed some alteration and improvement, they are not agreed that the abolition of the Service was the step necessary or desirable. Coupled with the movement was a drastic reduction in the funds for grazing administration. If, as some

believe, this is the first step in a program to reduce or abolish public administration of the public grazing resources, conservationists have real cause for concern.

A number of bills were introduced for the purpose of transferring public lands, especially grazing lands, to the states and to change established patterns of grazing administration. None of these received final action during the Congress, but a few made sufficient progress to sound a warning. Surely, these perennial attempts to undo the federal grazing administration will be introduced in the next Congress.

Several bills of overall importance were placed in the legislative hopper with the purposes of establishing a national resources policy, an overall resources council and providing for a continuing inventory of natural resources. These, as well as bills to set up a national scientific foundation, failed to be enacted, but they point to increased interest in the resources and their contributions to national defense and to the general welfare and economy.

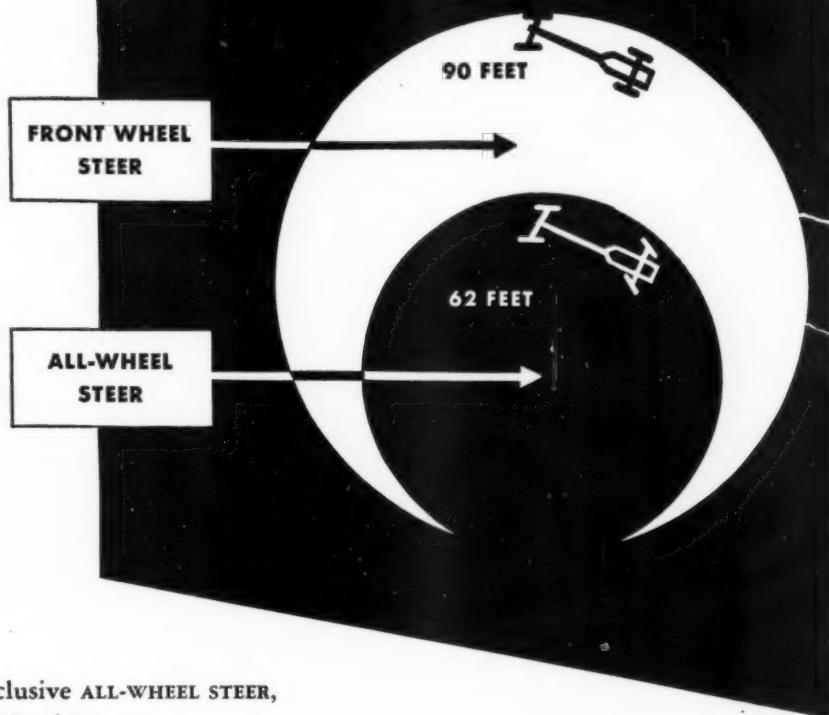
Of world-wide significance was the passage of a resolution providing for membership of the United States in the Food and Agriculture Organization of the United Nations. This paved the way for our participation in world forestry problems and activities.

Significant also was the treatment accorded the various bills to establish "valley authorities" in the nation's major river drainages. None of these achieved passage by either house, but through hearings and other channels a mass of evidence and data was obtained which helped clarify local and national issues.

Federal regulation of forest practices was proposed late in the second session of the Congress, but the bill remained in the House Committee on Agriculture. The bill, however, indicates a pattern of administration which doubtless will be brought to light again in the next Congress.

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WHAT THEY SAY

About the Higgins Lake Meeting and Program to be Submitted to the American Forest Congress

National leaders, meeting at Higgins Lake, Michigan, in mid-July, reviewed the results of The American Forestry Association's Forest Resource Appraisal and recommended a program of private, state and federal action to be submitted in October to the American Forest Congress (see August issue). The following comments on the deliberations and recommendations, in addition to those published last month, have been received:

"The Higgins Lake meeting was a success because the Program Committee had the best picture of what the situation really is that ever has been presented, and because of the willingness of all to merge their individualisms in a national viewpoint. For the first time since the Clarke-McNary hearings of 1923-1924 there has been developed a program that fits American ideas and conceptions and down to earth ways of doing things."—*W. B. Greeley*, chairman of the Trustees of the American Forest Products Industries.

"The work of the program committee was undertaken by a group of well informed and earnest workers. It is never possible to appraise the value of such a meeting, but it is my belief that it was well worth the time of those who participated, and all were men whose time is fully occupied."—*Tom Wallace*, editor, *The Louisville (Kentucky) Times*.

"An exceptionally constructive meeting in which the serious need for continued and expanded effort towards good forest management was fully recognized."—*George O. White*, state forester of Missouri.

"Seldom does one find 19 minds with such complete fidelity of purpose united toward preserving public interest in natural resources of every state."—*Charles H. Sage*, vice-president, Kimberly-Clark Corporation, Neenah, Wisconsin.

"The Higgins Lake conference was particularly successful in bringing about a large measure of agreement among widely diverse interests on many important and often highly controversial issues."—*S. T. Dana*, dean, School of Forestry and Conservation, University of Michigan.

"Appraisal report and committee recommendations comprise admirable basis for real forestry—national, state and local."—*E. O. Siecke*, College Station, Texas.

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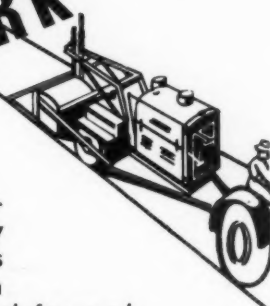
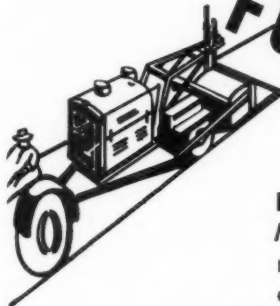
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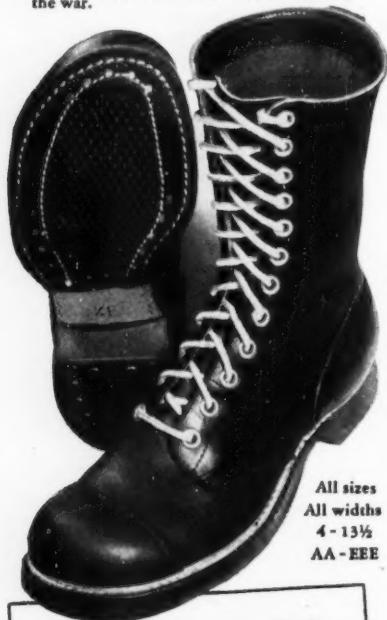
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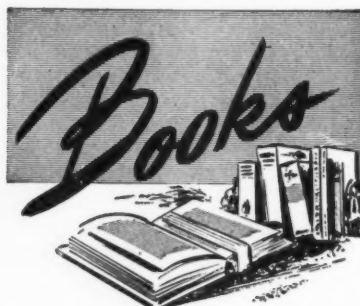
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ELK BELOW, by Orange A. Olsen.
Published by the Orange A. Olsen Memorial Committee, U. S. Forest Service, Ogden, Utah.

In revered memory of the life, work and contributions of the late Orange A. Olsen to the cause of wildlife on the western ranges, his associates and friends have assembled and printed in the form of a limited memorial edition, a collection of his photographs and articles on wildlife management. An introductory chapter—biographical in nature—is presented for the edification and review of those who knew him.

An eminent authority on game, fish and wild lands and their management, Mr. Olsen was in charge of Wildlife Management for the Intermountain Region of the U. S. Forest Service from 1931 until his death on March 2, 1945.

The book is dedicated to the present and future generations of wildlife students and enthusiasts. His life and outstanding achievements in his chosen field will remain a symbol of encouragement to those who follow in his path.

AFRICA DRUMS, by Richard St. Barbe Baker. Published by Lindsay Drummond Ltd., London. 159 pages, illus. Price 12s. 6d. (approx. \$2.50).

Written by a former Conservator of Forests in Nigeria and Kenya who has traveled widely in east and west Africa, this book brings the native scene to the reader in an intimate manner. In addition to recording the tribal lore, the author combines a treatment of ethnology with a study of African forest life and resources.

THUNDER GODS GOLD, by Barry Storm. Published by Southwest Publishing Company, Tortilla Flat, Arizona. 166 pages. ills. Price, \$2.75.

Dedicated to the prospector, "whose daring enterprise on lonely trails has built and will forever sustain the destiny of a metallic civilization," Thunder Gods Gold follows

the exploring Spaniards, savage Indians, reckless miners and prospectors and adventurers in their search for hidden gold.

NO PLACE FOR WOMEN, by Tom Gill. Published by G. P. Putnam's Sons, New York City. 220 pages. Price \$2.00.

Another engrossing novel by the able pen of Tom Gill, with all the trimmings of romance, excitement and suspense against a realistic background of a wartime South American natural rubber project.

Tom Gill writes with his usual flair for combining fiction and realism into a thoroughly readable story. His characters are vivid, interesting and natural.

THE HANDBOOK OF RHODODENDRONS, compiled and published by the University of Washington Arboretum Foundation, Seattle, Washington. 198 pages. Price \$5.00.

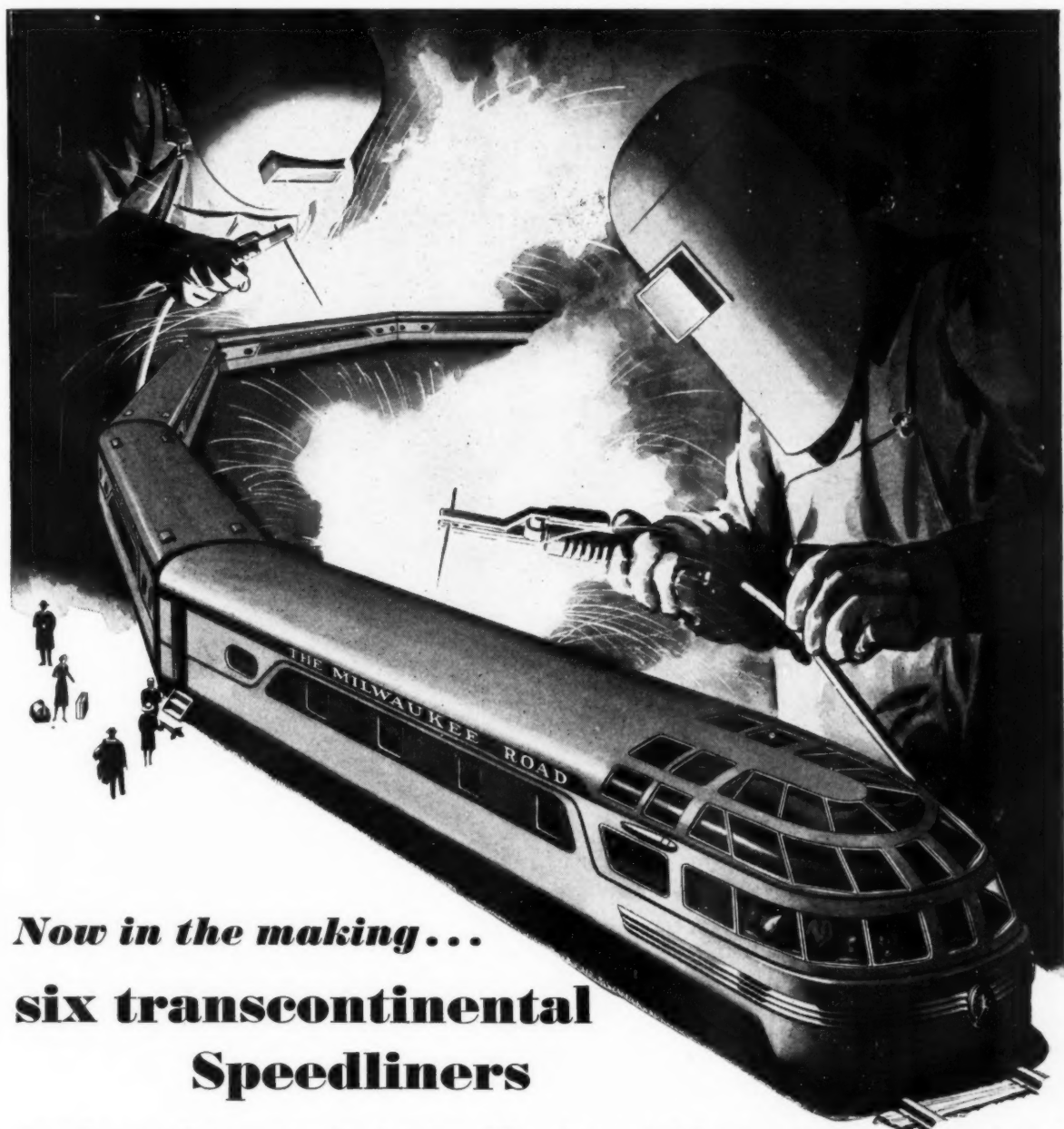
Brought together in this concise volume are the more comprehensive manuscripts on the genus Rhododendron, by authoritative writers, which first made their appearance during the past several years in the pages of the *Aboretum Bulletin* of the University of Washington Arboretum Foundation.

Of interest especially to gardeners of the Northwest region where rhododendron finds its natural habitat, this book provides general information as to the stature, habits of growth and ultimate heights of the many species, varieties and hybrids.

The various articles discuss the characteristic hardness of the species, soils and fertilizers for use in cultivation, methods of propagation, attacking insects and diseases, and other pertinent data. Included also is a limited bibliography of rhododendron and azalea literature.

HOW TO HUNT NORTH AMERICAN BIG GAME, by C. E. Hagie. Published by the Macmillan Company, New York. 195 pages. Illustrated. Price \$2.49.

Here is reliable and authentic information on every phase of big game hunting—from the selection of hunting territory to bringing home the bag. Suggestions for planning a trip, arranging for guides and for proper clothing are given in detail. Also fully discussed in individual chapters are all of the various big game animals in the United States and Canada. The author has been a big game hunter for more than thirty years.



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. . . On the Scream of the Puma

(From page 409)

in eastern Arizona he was led to the conclusion that the puma "... has a wild screaming cry which is thrillingly impressive when the shades of evening are throwing a mysterious gloom over the forests. In the mountains of Arizona one summer a mountain lion repeatedly passed along a series of ledges high above my cabin at dusk, uttering this loud weird cry, popularly supposed to resemble the scream of a terrified woman."

The late Ned Hollister, who at the time of his death was director of the National Zoological Park, Washington, D. C., recounts his experience with the puma in Louisiana. On February 23, 1904, he records: "Heard panthers crying about nine o'clock last night. There were probably two of them, as the calls were sounded at short intervals, sometimes only about a minute apart, and one seemed a little farther away. . . . The cry is a long drawn-out, shrill trill, weird and startling. It commences low on the scale, gradually ascends, increasing in volume, and then lowers at the end." Hollister believed "the pumas call more in the early spring than at any other season."

Regarding this big cat in its Florida habitat Charles B. Cory recorded, "The cry of the cub puma resembles the screech of a parrot, but it often utters a soft whistle. The cry of the old panther somewhat resembles the screech of a parrot, but much louder."

Enos Mills, one of the late naturalists of the Rocky Mountain area, recounts hearing the animal a "dozen or more times," and that the "screech of the lion, on three occasions there was a definite cause for the cry," one because of lost cubs packed off by a hunter, and the other two times "a wail in each instance given by the lion calling for its mate, recently slain by a hunter."

In recapitulating these observations it is noted that the sections from which the observers have cited their experiences with the puma scream represent a wide geographic area of the United States.

Ernest Thompson Seton in summarizing this subject states that the puma "has just as many sounds as the common cat; they are of the same types as those of the cat, but

they are magnified and intensified to a scale fitted to the superior bulk of the cougar, that is, about twenty times."

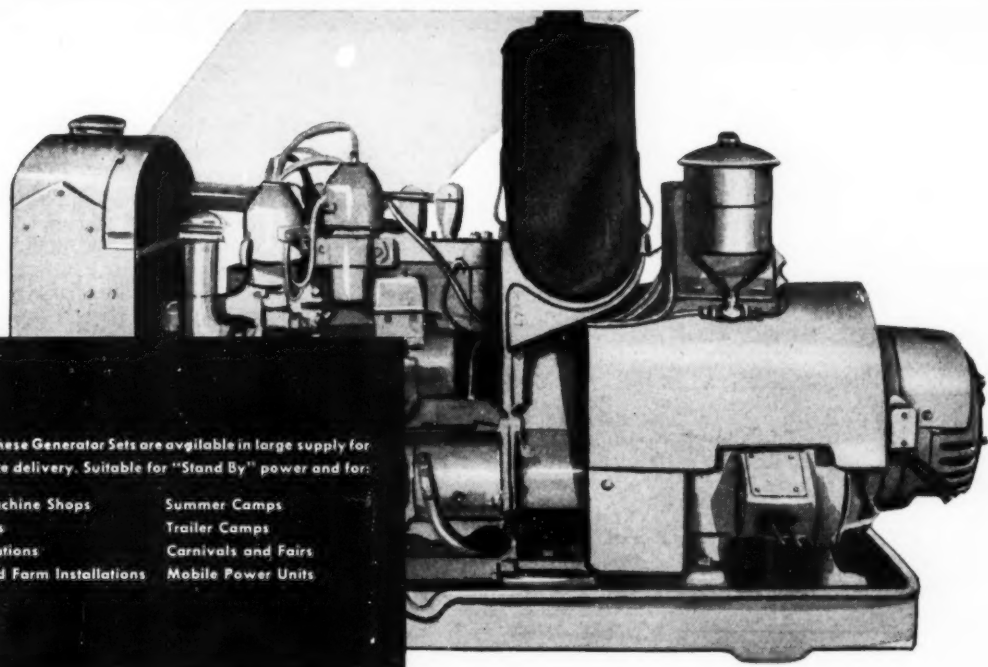
E. A. Goldman, who classified the various geographic races of the puma in the Americas, records: "It has a wild weird, scream-like cry not calculated to soothe the nerves of a night wayfarer on a lonely forest trail. This is uttered so infrequently, however, that some old hunters assert they have never heard the cry and are even skeptical that it is ever given."

A critical study of the anatomy of the puma's skull reveals several interesting characteristics. Foremost of these is the distance between the glottis and the base of the tongue. This in most cases is not more than an inch or sometimes an inch and one-half. This condition, coupled with the fact that the animal seldom is able to extend its tongue more than approximately one inch, makes possible the piercing scream.

In spite of the foregoing evidence many western hunting guides and outdoor men still question the animal's ability to make such a sound. They do this in all sincerity—and some of them have spent a lifetime in the animal's mountain habitat. They not only have never heard it but many have never seen the animal unless aided by a dog trained in puma hunting.

E. W. Nelson and E. A. Goldman, in the course of their thousands of miles of trekking through Mexico, often camped in the main habitat of this creature but seldom saw it.

True also is a similar experience of many cowboys and puma hunters of the West who have spent much of their lives riding in the haunts of the animal. This trait of its sly skulking and elusive manner of keeping itself from being seen by man is one of the most remarkable of so large an animal. Hence it is possible that when this particular vocal sound is made by the animal it is so rarely seen at the same time that it is not associated with the puma. Probably it is this fact that has developed, in part, the negative view held by many as to this great cat's ability to sound its piercing scream.



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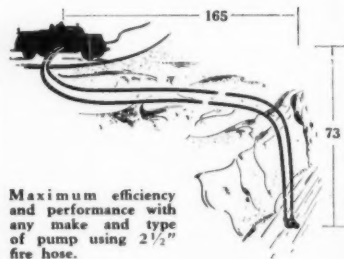
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Wooden Boats of Ecuador

(From page 412)

able of the parts below water line to attack by marine borers, it is fitted to the boat frame so that it can be removed with little difficulty. A boat is expected to outlive several keels. Unless great care is given to protect the member with copper paint or pitch, borers will destroy a keel made of mangle in three years. With careful attention to recoating, the life may be extended to about eight years.

The stem is made of guayacan, rabbeted for planking. It rests on the keel, and is backed up with an apron of the same species and large knees. Stern and rudder posts are made of straight pieces of guayacan and set square on the keel. The frames are made to meet on top of the keel and are in turn covered by a single keelson. They are double only near the ends of the futtocks or at joints, and they are not uniformly spaced. A light "tipping" of a frame can sometimes make it fit better when first set in place.

With a sense of practicality and

realism, the shipwright does not find it necessary to trim, square and smooth carefully all surfaces or sides of a frame, deck beam, or similar member. The contact surfaces are carefully shaped, but little attention is given to other surfaces unless necessary for service requirements. As a result, the first impression is that the workmanship is crude and sloppy, but a closer inspection will invariably show that the contact surfaces are well joined.

The planks below the water line are of amarillo, a species highly regarded by Ecuadorian builders for its strength, durability, and resistance to attack by marine borers. Above water line black laurel is used, a species that gives good service but is not so highly regarded as amarillo. The same species are used for decking.

After nailing, the planking is dubbed to round the outside surfaces to the lines of the bilge and elsewhere as required. Planking seams below water line are caulked with coconut fiber, a material said to be more durable under water than hemp caulking and, of course, much less expensive. A preparation made from asphalt obtained from local deposits is used as a seam composition, and this same asphalt is used in making a bottom paint. Above water line and on deck, hemp caulking is used, since it withstands alternate wetting and drying better than does the coconut fiber.

All fastenings are made of steel bolts or nails.

Local boats are not sheathed inside, though the flat of the hold usually is planked to keep the cargo out of the bilge water. The comparatively light stringers and the exterior planking are relied upon for strength in lieu of sheathing. The length-width-depth ratio is, of course, favorable for strength, the species used are exceptionally strong, the one-piece keel also is very strong, and boats in the local coastwise trade are not commonly subject to heavy weather. All these factors more or less counterbalance what may appear to be structural shortcomings.

Construction practices at Bahia de Caraquez are essentially the same as those at Posorja, but on a smaller scale since there were fewer experienced ship carpenters available. Species available locally are somewhat more restricted than in other shipbuilding centers. At Bahia black laurel was used for planking and

decking, and it is claimed locally to be superior for that purpose to such species as Douglasfir, particularly in its resistance to attack by marine borers.

The practice at the Esmeraldas shipyard differs from that observed in other localities in that the owner of the yard was not hidebound by past experience and precedent. At this yard plans of the proposed boat were prepared and the lines laid out on a loft floor. Frames and timbers were shaped in a workmanlike manner, and more attention was given to details of construction that affect strength, durability and appearance. Since mangle in keels is comparatively short-lived due to marine borers, other species of greater resistance to attack were used. These species were obtainable nearby at reasonable cost and in large sizes, and are comparable in strength with mangle. Some of the planking and decking used in this yard was cut at local sawmills, but most of the heavier items were cut by hand methods.

Since species that rank high in durability are available, no effort was made to use preservatives to prevent or reduce decay hazard. Nor did there appear to be any evidence of "salting" boats as a protective measure.



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Loggers Take To the Air Waves

(From page 403)

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8:20 A.M. Camp said they were loading out arch. It would be in by noon.

8:30 A.M. Camp reported gravel truck broke down.*

8:54 A.M. Woods called. Number of trucks OK.

9:20 A.M. Earl Headrick called from camp. No. 13 battery generator broken down.*

9:25 A.M. Drive shaft on dump broken, camp reports.*

9:36 A.M. Camp called. Man quitting.

10:02 A.M. Camp called to give more information for timekeeper on man quitting.

10:04 A.M. Camp called to change order for cookhouse for more milk and coffee.

10:16 A.M. Camp called to say arch would be loaded out late.

10:45 A.M. Camp called in about generator parts to order.*

11:15 A.M. Office reports buckner coming to camp.

12:50 P.M. Camp reported power shut down for oil change and would be off the air.

1:06 P.M. Camp gave timekeeper information on deducts for man quitting.

1:10 P.M. Time for man from camp.

1:13 P.M. Camp asked for information on hospital payments for service man.

2:32 P.M. Office wanted pump brought in at night.*

3:55 P.M. Plumber needed at new camp.

4:36 P.M. Camp checked out for supper.

Where asterisks (*) appear on this log, Roll Williams points out that a special trip from camp or office would have been necessary.

This one day's actual log for F.C.C. gives some idea of how much Werner uses the radiophone, what it means in time saved and how headquarters is able to keep in constant touch with every section of the sprawling logging operation.

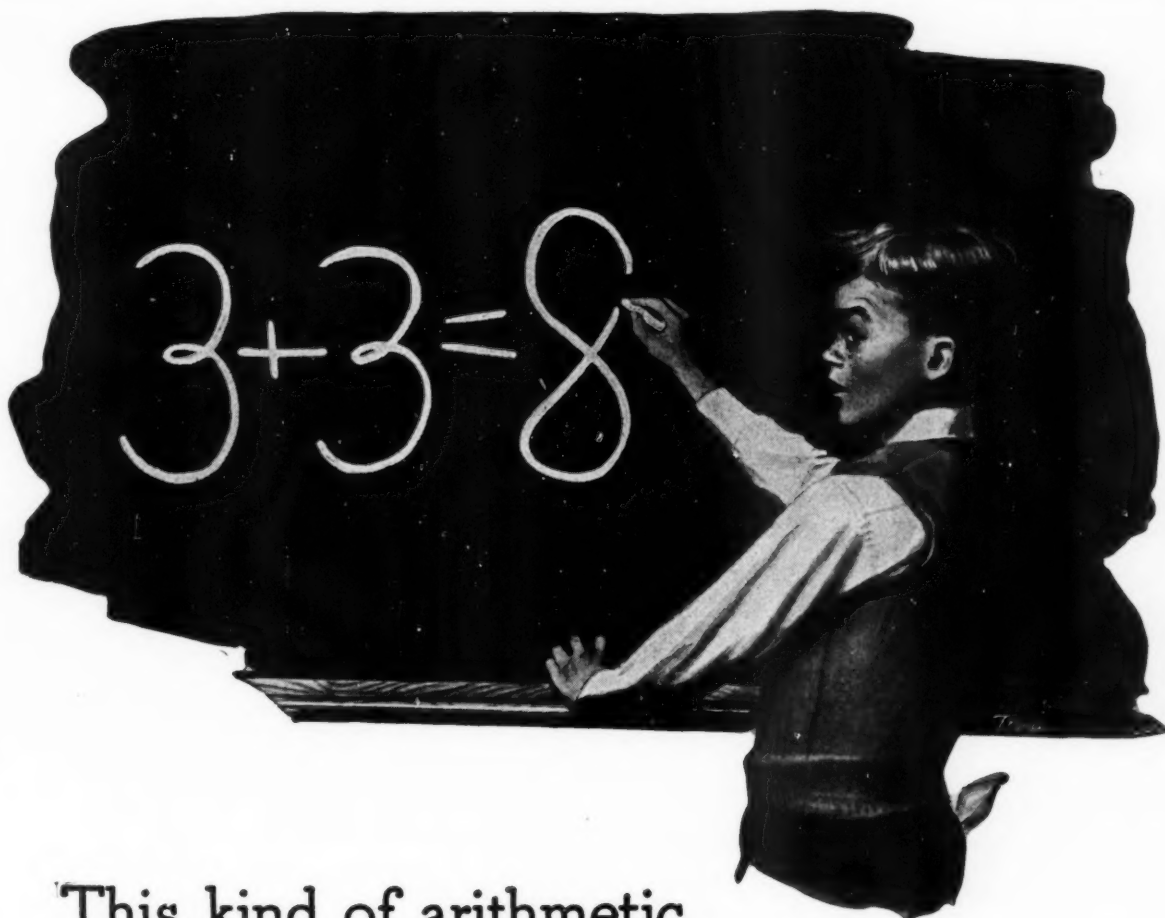
Key men in the woods are just as enthusiastic over the radiophones as Roll Williams and the two Wilsons. "Saved us from being shut down many a time," said Jim Carlyle, camp timekeeper. And George Compton, rugged civil engineer, who lays out Werner's logging road system, comprising some 50 miles of year-around gravelled, highway-type roads, says, "You just can't say enough about radiophones. I often wonder how other outfits get along without them. I know we couldn't."

Bill Headrick has a travelling machine shop built on a truck, and is often the man-of-the-hour. Cutting Boss Harris Sowers points out that when a breakdown occurs at a landing or spar tree, which invariably happens when it shouldn't, he can get in touch with trouble-shooter Bill Headrick at once. Bill is the kind of a guy who can listen to a machine running and tell what is wrong, and furthermore, according to Sowers, can fix it in jig time.

A breakdown of the cost of the radiophone equipment which was specially built by the Oregon Electronic Manufacturing Company at Portland, shows that each main receiving and sending set cost about \$325. The two portable sets in the cars cost another \$125 each. The portables can be used as regular portables by lifting them out of the glove compartment and tossing the aerial over a tree limb. William Sanders, radio expert with the Oregon State Forestry Department, helped lay out the Werner radiophone system. The large sets at camp take 25 watts power. Total cost of the entire system, including antenna runs close to \$1,250, Roll Williams says.

Now that loggers have taken to the air waves, some of the old-time users, like ocean-going tramp steamers, may be in for some puzzling moments when they hear a conversation something like this:

"The whistle punk needs a new jerker and the crummie broke down just short of camp, but we could hear the gut hammer ring and the ram-road was aboard and he cussed in seven dialects. Hear me? KEPW."



This kind of arithmetic may put Johnny through college

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So it's quite right to figure that 3 plus 3 equals 8 . . . or 30 plus 30 equals 80 . . . or 300 plus 300 equals 800!

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My Favorite Tree

(From page 395)

ing at him—and left the evanescence of worldly pleasures and went in search of true knowledge, clad in the ochre colored garments of a vagrant, carrying the staff and alms bowl in his hands. He realized that ceremony and sacrifice, feasts and penance, led only to pain and suffering, never to knowledge devoid of reward and punishment. After long wandering, he arrived at Gaya (now Bodh-Gaya) in the province of Bengal.

Presently he prepared for the fierce hexannual fast (*Shadvashika Vrata*), which is supposed to last for six years and is initiated by a complete stoppage of inhalation and exhalation, the suspension of all emotion, functions of body and agitation of mind.

During this fierce fast he was still unsatisfied. It was then that he wandered to a nearby village and beheld the sacred Pipul Tree. He sat down in its shade facing east. "Let my body shrivel up at will, let my skin, flesh and bones rot to nothing and my blood dry up if they will, but never shall I rise from my seat until I have attained true Enlightenment."

For seven days and seven nights he sat immobile and steadfast in contemplation. For another seven days and seven nights he walked in a never ceasing circle around the Holy Tree; another seven days and seven nights he sat gazing steadily at the tree without the interruption of a wink; a fourth week he spent sitting there, while his mind traversed the earth from the East to the West Ocean, and then Enlightenment came to him and he was the Lord Buddha

(the word "Buddha" means "Enlightenment")!

It was early in the afternoon when I arrived before this sacred tree, which is still hale and hearty despite its great age. I was glad for the comfort its precious branches afforded as I sat down before it with a group of devout pilgrims who had come to worship, and to snatch each falling leaf as it fluttered to the ground. And like any Buddhist pilgrim, I was properly affected by the sacred and austere surroundings. As I mopped my brow (for it was 107 degrees in the sacred shade), I looked across at a little man in prayer. I hurried to take his photograph before he might finish his devotions and it was then that I discovered that my little devotee hadn't moved from this spot for six years. He was a Buddhist priest who had walked all the way from Tibet to incant his prayers on this sacred spot, and had vowed to remain there for the rest of his life.

What interested me most was the "Buddha Promenade." Here the Blessed One spent seven whole days and nights walking up and down in deep meditation after having obtained Enlightenment and the Bliss of Nirvana.

So I walked along this Buddha Promenade as he had done, and caught some of the fluttering leaves as they fell from the tree. I have them now in the odditorium at my home in Mamaroneck, and I regard these leaves after the manner of the Buddhists, as the most sacred of my possessions.

BELIEVE IT OR NOT!

AUTHORS and PHOTO CREDITS

NORMAN CLYDE (*Lake of the Sky*) writes of the outdoors from Big Pine, California. A. G. HALL (*A Family Discovers Forestry*) is assistant editor of AMERICAN FORESTS. ARTHUR W. PRIAULX (*Loggers Take to the Air Waves*) is a feature writer and lives in Eugene, Oregon. CARLOS SULIT (*Forestry Fiasco in the Philippines*) is the officer in charge of the Bureau of Forestry in Manila. L. V. TEESDALE (*Wooden Boats of Ecuador*) is an engineer at the Forest Products Laboratory, Madison, Wisconsin. JOHN B. WOODS (*Report of the Forest Resource Appraisal*) is director of the Appraisal. STANLEY P. YOUNG (*... On the Scream of the Puma*) is senior biologist of the Fish and Wildlife Service.

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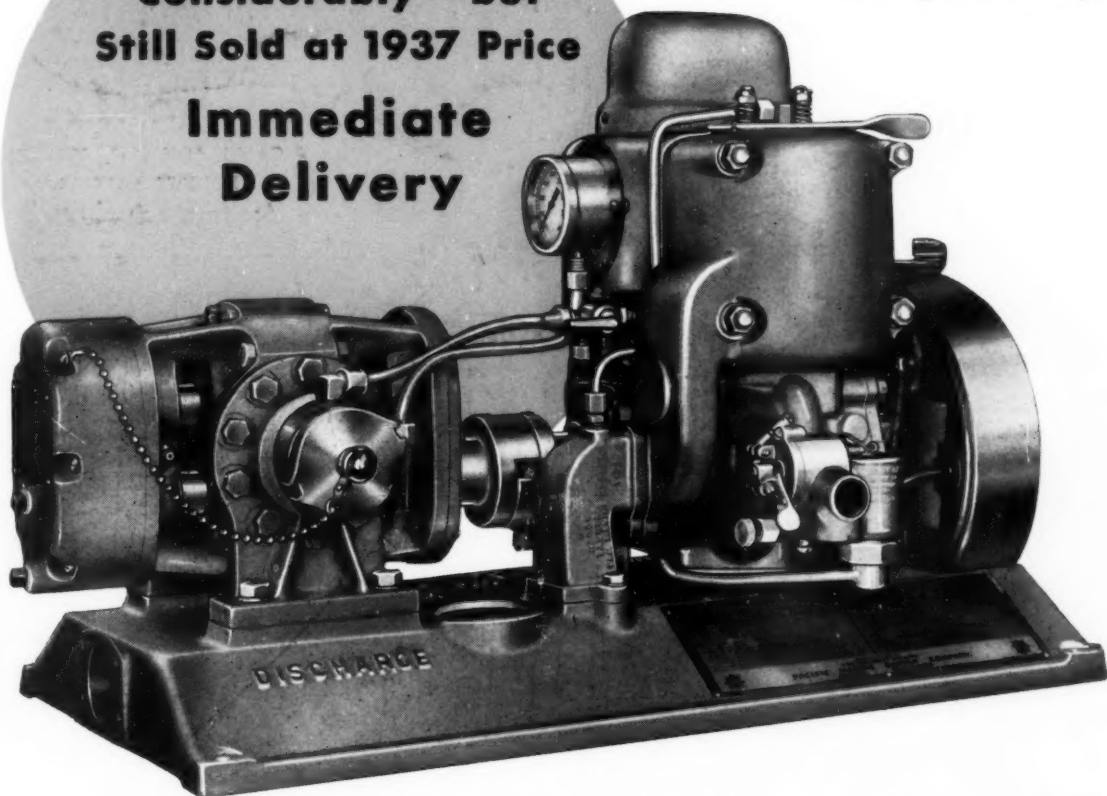
Anchor Light Studio—Page 430 (right).
William Bancroft—Page 404.
Bunnell—Page 405.
Devereux Butcher—Pages 430 (left) and 431 (top and 2nd from top).
L. L. Laythe—Page 409.
Pa. Game Commission—Page 429 (right).

Pendleton—Page 401.
Fred Shulley—Page 406.
Chas. F. Steiger—Page 431 (3rd from top).
U. S. Forest Service—Page 429.
Mode Wineman—Page 393.

**Improved
Considerably — but
Still Sold at 1937 Price**

**Immediate
Delivery**

**Post-War Type "Y"
Pacific Pumper**



WITH PRIDE we offer our post-war Type "Y" Pacific Portable Fire Fighter Pumper.

Tough—and battle proved around the world, the Type "Y" holds the enviable record of being the most powerful and dependable unit for its weight and size ever built.

Simplified design makes both power-head and pump completely accessible for inspection and adjustment.

A feature of the Type "Y" is the water-cooled muffler cast in its base. An exhaust cut-out also is provided for use when emergency demands that every ounce of power be utilized.

The Type "Y" Pacific Pumper combines:

1. *Extreme Light Weight*
2. *Superbly Smooth Power*
3. *Unmatched Efficiency*
4. *Ready Accessibility*

It has *everything* a portable pumper should have to guarantee assured service under any and all conditions—built-in stamina, ample power, maximum pumping capacity. Can be easily and quickly strapped or clamped to a packboard, forming a well-balanced one-man load, net weight, complete, ready to operate, 70 pounds.

In the post-war model, crank case oil seals have been added; efficiency and moisture resistance of the magneto have been greatly improved; hydraulic speed control has been in-

stalled; a high degree of standardization has been attained, and a comprehensive distributor organization set up to back up sales with service.

Type "Y" is recommended as the best all-purpose pumping unit for every emergency need. Ideal for forest fire control; for fire protection in communities, resorts, on estates; for protecting rights-of-way, bridges, trestles, snow-sheds, as well as other types of property.

Type "Y" Pacific Portable Fire Fighter Pumps have been proved by the U. S. Navy, many governmental agencies and commercial users. Still sold at the 1937 price. Immediate delivery as long as present stock lasts.

Also, Accessories

Having built up during the past year a substantial stock of accessories, we are in a particularly favorable position to make "double-quick" deliveries. To list a few—Siamese connection; Hose tee; Pressure relief valve; Pressure relief automatic check valve; Unit Siamese valve; Hose couplings; Bleeder valve; Pacific Combination solid stream nozzle.

**Pacolized Linen Forestry Hose
Permanently Mildew-Proof and
Rot-Resistant**

Pacific Pacolized Linen Forestry Hose is unsurpassed in strength, durability and lightness of weight. Per-

manently protected from mildew by an exclusive "Pacolizing" treatment. The threads are so thoroughly impregnated that the treatment will last the entire lifetime of the hose. Pacolizing does not stiffen the fabric, but actually adds to the flexibility of the hose. Pacific "Pacolized" Linen Hose is only one-third the bulk of ordinary cotton rubber lined hose.

Please address or visit us, or our distributor if handier, for more complete and detailed information.

Manufactured by

**Fire Fighting Equipment Division
PACIFIC MARINE SUPPLY CO.
Seattle 1, Washington**

Distributed by

BLANCHARD ASSOCIATES, INC.
25 Hampshire Street, Cambridge, Mass.
ARMSTRONG & GALBRAITH, INC.
623-625 Sixth Avenue, New York, New York
SAGER-SPUCK SUPPLY COMPANY
360-366 Broadway, Albany 1, New York
WAGLER EQUIPMENT COMPANY
2544 W. Greves Street, Milwaukee, Wis.
CURTIS MARINE COMPANY, INC.
554-556 Front Street, Norfolk 7, Virginia
PANAMA PUMP COMPANY
Hattiesburg, Mississippi
JAY L. HARMAN FIRE EQUIPMENT CO.
307 San Francisco Street, El Paso, Texas
A. W. DAVIS SUPPLY COMPANY
2351 N. W. York St., Portland 10, Oregon
WESTERN FIRE EQUIPMENT CO.
69-75 Main Street, San Francisco 3, Calif.
BROWN, FRASER & CO., LTD.
1150 Homer Street, Vancouver, B. C.



JOHN C. WEBB

"The **INDIAN** FIRE PUMP

Is a Very Valuable Piece of Equipment to Have On Forest Fires and Also Grass Fires . . . "

SAYS JOHN C. WEBB,
FOREST RANGER,
SCOTTSBORO, ALABAMA



Here is the unsolicited testimonial from Forester Webb:

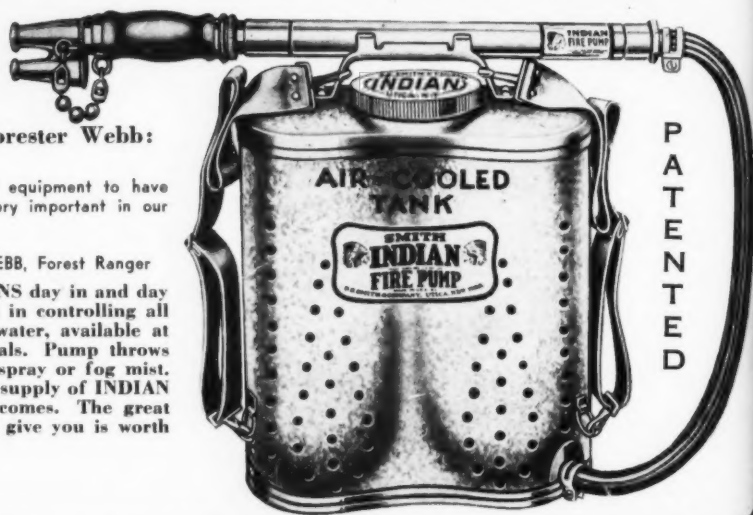
D. B. Smith & Co., Utica, N. Y.

The INDIAN FIRE PUMP is a very valuable piece of equipment to have on forest fires and also on grass fires. We find it very important in our organization.

Very truly yours,

JOHN C. WEBB, Forest Ranger

It is comment like this from men who use INDIANS day in and day out which speaks so much for their effectiveness in controlling all types of fires in their early stages. Only clear water, available at any stream or water supply, is used—no chemicals. Pump throws 30 to 50 ft. straight stream or nozzle adjusts to spray or fog mist. Prepare for fire now by equipping with an ample supply of INDIAN FIRE PUMPS—be ready when that emergency comes. The great feeling of security which INDIAN FIRE PUMPS give you is worth alone many times their modest cost.



D. B. SMITH & CO. 405 MAIN ST. UTICA 2, N.Y.

PACIFIC COAST BRANCHES:

HERCULES EQUIPMENT & RUBBER CO., 435 Broadway St., San Francisco, Cal.
ROY G. DAVIS CO., 617 E. Third St., Los Angeles 13, Cal.
FRED E. BARNETT CO., 2003 S.E. 6th Ave., Portland, Ore.
FRED E. BARNETT CO., 500 Spring Street, Klamath Falls, Ore.
MILL & WINE SUPPLY, 2700 Fourth Ave. S., Seattle, Wash.
FRED E. BARNETT CO., Broadway & Harris St., Eureka, Cal.

CANADIAN AGENTS:

BINGHAM & HOBBS EQUIP. CO., 285 W. 3th Ave., Vancouver, Canada
DUKE EQUIP. CO., 187 Duke St., Montreal 2, Canada

